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'Twas Ever Thus

"I AM heartily in favor," said the Leading Industrialist, "of this reciprocal trade program!" "I too," declared the Prominent Manufacturer, "agree that unless we have freer trade we are in for a devil of a fix."

"However," resumed the L. I., "I build blidgets, which as you well know are turned out by slave labor in Sandarobia. To allow even inferior grade blidgets to enter the U. S. A. almost duty-free would be utterly ruinous!" "Again I agree," assented the P. M., "for I make didgets, which as everyone knows are the product of peons in Pontavia. A 10-pct cut on didgets would ruin the country!"

A Union Leader was standing outside the washroom where the Leading Industrialist and the Prominent Manufacturer were discoursing. "I do not agree with you fellows on a lot of things," he said, "but if these guys in Washington let down the bars on the gadgets they make at our plant, the boss says I'll be looking for a job. I'm not so sure he was allowed to say that under the Wagner Act, but I think he's right so I won't turn him in."

Now it chanced that a Little Fellow overheard all this conversation and was sorely puzzled. "Tell me, gentlemen, how this can be?" he inquired. "For you are all in favor of expanding our trade with the rest of the world, and you say that this must be done by our new reciprocal trade agreement policy. But none of you successful gentlemen seems willing to permit any reductions on any of the products you are interested in. I must be pretty stupid because I thought, after reading the papers, that almost everyone would have to make some concessions so as to restore world trade and perhaps prevent another war."

"Oh, you are quite right indeed!" said the Leading Industrialist and the Prominent Manufacturer and the Union Leader, all speaking at once. "Some concessions must certainly be made, Little Fellow. But haven't we shown you that they can't be made in our products? Since that is obvious, it is quite clear that the concessions must be made in other things. Perhaps in cabbages . . ."

"No, not in cabbages!" shouted a Farmer who had just happened on the scene.

The Little Fellow shook his head and walked away, wondering what would happen at Geneva in the spring.





Every Order Must First Pass Metallurgical Control

The Inland metallurgists in charge of control are real critics and every order sent to the mill must first pass them before steel can be processed. They take one order at a time, check to see if it is similar to a previous order; if not, they examine blueprints of the part, and may even call at the customer's plant to study the method and equipment for fabrication. After they have thoroughly

studied an order they designate what type of steel is to be furnished, and how it is to be processed.

Metallurgical control is another of the many methods Inland uses to assure the right quality steel for each order entered by a customer. Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois.

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INLAND STEEL

April 8, 1947

► Since Argentina has contracted to buy annually from Bolivia at least four times as much tin as its smelters can handle it would not be surprising if the U. S. State Dept. stepped into the picture. The State Dept. may inform Peron that his country will not receive a single base box of tinplate from the United States unless he releases most of this excess.

► The twilight market steel operators from the canyons of lower Broadway are making approaches to steel starved Britons. While it is believed that only a few small lots are being offered, the chances of sales are remote because import licenses are rigidly controlled. A few will nevertheless be granted in special cases.

► The \$20 million rocket range which the British are establishing across Australia and the Indian Ocean may cover 3000 miles, with rockets followed by ship and shore radar to Christmas Island in the Indian Ocean. Test firing costs are estimated at another \$10 million a year.

► A western bus operator recently road-tested a 60-ft bus having a body made of 65 pct magnesium and 35 pct aluminum.

► In addition to providing jet engines to clear Britain's recently snowbound roads and railways, the British aircraft industry used its own resources to maintain production. Lacking coal, the Avro Co. used a battery of Rolls-Royce "Nene" jet engine combustion chambers to heat factory boilers—a conversion which proved so successful that it is being retained permanently.
Rolls-Royce and Napier devised a regenerative setup for their test stands: Engines on test supplied power for the factory and fed back a surplus into the national grid system.

► Industrial production levels may have to average as much as 90 pct above 1939 in order to maintain maximum employment in 1950 when the available labor force will amount to about 62.5 million. At this time, if the long term trend is maintained, productivity per man hour would be at least 20 pct above prewar levels.
Assuming that working hours remain the same and making allowances for seasonal unemployment and for the armed services, Census Bureau and BLS officials estimate that maximum employment in 1950 will require a minimum of 59 million civilian jobs.

► Emphasizing Canada's drive to achieve independence in steelmaking is the report that Steel Co. of Canada is planning further heavy expenditures to increase coke, pig iron and ingot capacity, and add finishing equipment. This will be in addition to \$21 million earmarked for construction at the end of 1946.

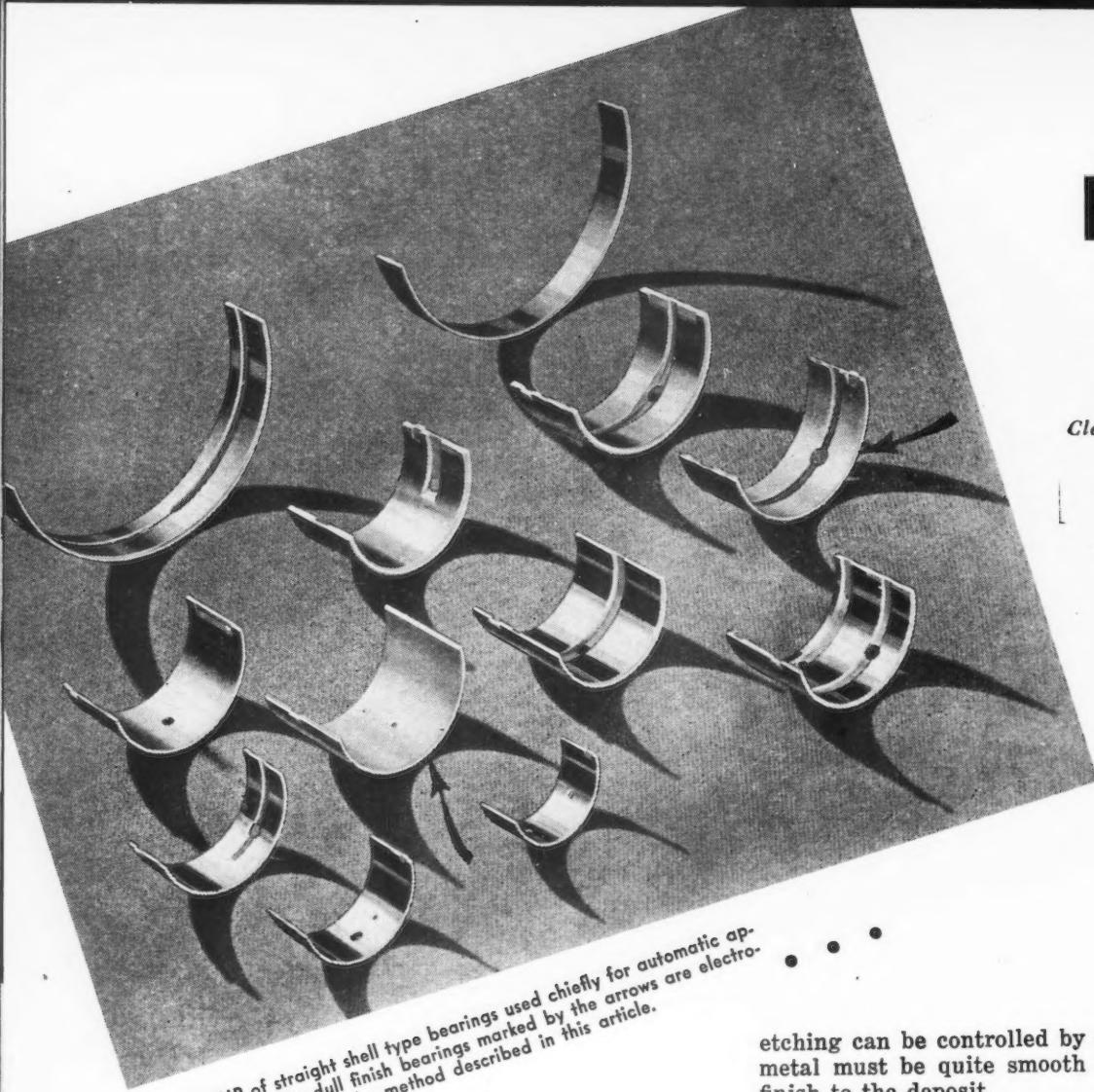
► A Koppers Co. piston ring plant, anxious over its sugar supplies, has found a way to release its share to harassed housewives. Seeking a substitute for sugar as a reducing agent in solutions for plating porous chrome piston rings Koppers chemists found that maltose syrup, despite a chemical reaction different from sugar, achieved the same final result.

► A Canadian steel mill specializing in rimmed steel openhearth heats forces powdered graphite into soft heats as a means of introducing carbon into the composition and greater heat and activity into the molten bath. Addition of this carbon into the highly oxidized bath acts almost instantly to raise the temperature and increase reactivity.

► Some aluminum market observers are predicting that the demand for building construction, combined with the requirements of the transportation field, especially for truck bodies, buses and trailers will tax existing aluminum rolling capacity this spring.

► During the war when the Dutch were forbidden to listen to foreign broadcasts employees of the Philips works made midget sets on a sub rosa basis, building them into books, baby powder tins and bed lamps. Most of them used reflex circuits with only two acorn tubes.

Precision



A GROUP of straight shell type bearings used chiefly for automatic applications. The dull finish bearings marked by the arrows are electroplated by the method described in this article.

PRECISION plating is comparable with conventional plating except for the additional problem of maintaining a definite size and finish which is comparable in all respects to machined surfaces. This plating is relatively expensive, and is economically sound only when it saves difficult machining operations or when it allows the part to be fabricated with a reduction of mechanical tolerances. Silver plating on steel backs for bearings with dimensional tolerances similar to cast materials on steel backs has been described in the past.^{1, 2, 3, 4}

It has long been recognized that the degree of adhesion of a plated material is closely connected with the pretreatment and history of the metal surface prior to electrodeposition, which includes the degree of cold work performed on the metal surface before cleaning and plating. The degree of cold work on the surface appears to govern the loss of adhesion, since either a chemically clean mildly abraded surface or a highly polished surface will result in an adherent deposit while a surface which is chemically clean but severely abraded or cold worked will show poor adhesion. However, for maximum adhesion the base metal should be etched.⁵ For ferrous or nonferrous materials, anodic etching is generally the most satisfactory because the rate of

etching can be controlled by the current. The base metal must be quite smooth to give a satisfactory finish to the deposit.

In order to minimize the excessive roughening caused by anodic etching, it is usually advisable to electropolish the base metal prior to etching, especially in the case of alloy steels. Electropolishing removes the cold worked layer and leaves the base metal comparatively smooth; however, a dense passive film is formed on the base metal. This film is removed by cathodic activation in hydrochloric acid with the result that the surface is active and smooth so that an adherent deposit is obtained which will reproduce the crystal structure of the base metal in the plate, especially along the bond line.

Certain types of steel compositions, such as high carbon steels, form a carbon smut when subjected to this process. For a smooth deposit the smut must be removed, either mechanically or chemically, before deposition. This step must be performed without undue delay because of the danger in surface oxidation.

Usually precision plated metals or alloys in the bearing industry are deposited on steel, silver, or medium to high leaded bronzes.

The results of more than a decade of bearing development have clearly demonstrated that the easiest way to increase the fatigue resistance of bearing materials, such as the babbitts, was to reduce the thickness to a minimum.⁶ An ideal thickness, from this point of view, is approximately 0.001 to 0.002 in. for present engines. In mass produced engines, these extremely thin layers of babbitt or overlays directly

Plating of Bearing Alloys . . .

on steel are questionable because they do not allow sufficient engineering tolerances for safe operation. If the loading on the bearings makes it necessary to have these thin layers so that there is sufficient fatigue resistance in the bearing material, then in operation it must be expected that the journal will sooner or later wear through the overlay. The removal of the bearing material from the steel back allows the journal to contact steel with the result that the journal will be scored and probably ruined.

Another serious objection to these thin bearing layers is the dirt present in an operating engine. The dirt going through the bearings tends to cut grooves or imbed itself in the babbitt to a depth which corresponds approximately to the diameter of the dirt particle.

Therefore, it becomes paramount that to use safely thin babbitt overlays directly on steel, the load must be low and the lubricant clean. If the loads are sufficiently low and the lubricant sufficiently clean so that the bearing will operate the expected length of time without any appreciable wear on the overlay from the journal, then there is no particular reason why the overlay should not be placed directly on the steel. In some cases the dirt problem can be so severe that soft bearing materials will become loaded with dirt and promote seizure.

These thin overlays have the advantage in that they may be precision plated to size, eliminating subsequent machining operations. The most satisfactory overlay to date has been a ternary deposit of lead-tin-copper.

The superior surface characteristics of tin and lead base babbitts have been responsible for the development of trimetal bearings which are fabricated with a steel back, an intermediate layer, and a surface layer. With this construction a high fatigue resisting intermediate alloy or metal can be used in combination with a precision plated overlay. Trimetal bearings are rapidly becoming standard in the medium and heavy duty truck, diesel, and aircraft engine fields. In most of these applications the overlay will wear through within the expected time between overhauls of the engine; consequently it is necessary to have an intermediate layer which is in itself a bearing material.

These intermediate materials are usually either silver or copper-lead alloys, with or without the addition of minor alloying constituents such as silver or tin. Silver possesses greater fatigue resistance than any of the copper-lead alloys. In general, the fatigue resistance decreases as the lead is increased in the copper-lead alloys so that at 35 pct Pb, 65 pct Cu, it is approximately twice that of tin base babbitt. By selecting the proper intermediate bearing material, any convenient thickness required for design purposes can be used. However, these materials lack either the overall surface running characteristics or the corrosion resistance expected for desirable bearing performance so that a thin precision plated

Development of methods for precision plating of bearing alloys, which compete with present commercial casting processes and are equivalent or superior in performance because of the added advantage of more accurately controlled mechanical dimensions of the bearing materials, is described in this article. The fundamentals of trimetal bearings are reviewed, and data are given on plating procedures for both ferrous and nonferrous bases, bath compositions, and rack design.

babbitt overlay enhances the performance of these materials to a very marked degree.

The two procedures involved in the present precision plating processes are plating on either a ferrous metal base or a nonferrous metal base. In general, silver is plated on a ferrous base while lead-indium or lead-tin-copper is plated on either a silver or a copper-lead base.

Flow sheet for precision silver plate on ferrous base:

- (1) — Degrease
- (2) — Racking
- (3) — Mask, if necessary
- (4) — Clean — mechanically if wax is used as masking medium
- (5) — Electropolish
- (6) — Rinse
- (7) — Electrocleaner
- (8) — Rinse
- (9) — Activation Bath
- (10) — Rinse
- (11) — Silver strike
- (12) — Silver plate
- (13) — Dragout
- (14) — Rinse (hot)
- (15) — Unrack
- (16) — Heat treat, if necessary
- (17) — Inspect

Flow sheet for precision lead alloy plate on silver or copper-lead base:

- (1) — Degrease
- (2) — Rack
- (3) — Alkali etch
- (4) — Rinse
- (5) — Pickle (omit for silver)
- (6) — Rinse
- (7) — Silver strike
- (8) — Rinse
- (9) — Lead alloy plate
- (10) — Dragout
- (11) — Lead-tin flash
- (12) — Cold rinse
- (13) — Hot rinse
- (14) — Dry — hot air
- (15) — Unrack
- (16) — Heat treat, if necessary
- (17) — Inspect

These flow sheets constitute the basic operations of precision plating as performed at the plant of Cleveland Graphite Bronze Co.

Electrochemistry of Precision Plating Baths

Degreasing—The work is degreased in a conventional manner in boiling vapors of trichlorethylene until work approaches the temperature of the boiling solvent.

Rinsing—All rinses are cold running water except the hot rinse which has a steam coil in the running rinse tank.

Electro-polishing—The phosphoric-sulfuric-chromic electropolishing acid bath developed by Imboden and Sibley⁷ for low carbon steels is used. The bath has a nominal composition listed below:

Sulphuric acid	15 pct
Phosphoric acid	65 pct
Chromic acid	5 pct
Water	15 pct

The tank is equipped with cooling coils so that the temperature is maintained below 113°F. The work is electropolished for 3 min at 3 amp per sq in. with approximately 18 v.

Electrocleaner—The electrocleaning is carried out anodically at 80 to 100 amp per sq ft at 104° to 113°F so that wax may be used as a masking medium. Any good commercial alkali cleaner for steel is satisfactory in concentrations of from 45 to 90 g per liter for approximately 1 min.

Activation Bath—The work is cathodically etched in 18° Be hydrochloric acid for 1 min at 50 to 60 amp per sq ft to completely remove the anodic films.

All other baths employed for plating silver have been described by the writer in an earlier paper,⁴ and no attempt will be made to include them at this time.

Alkali etch—The bath is a combination sodium cyanide and sodium hydroxide cleaner which will etch silver, copper, or copper-rich phases of a copper-lead intermediate layer. The work is made anodic with current density of 40 to 80 amp per sq ft at room temperature for approximately 1 min.

Sodium cyanide (NaCN)	75-85 g per liter
Sodium hydroxide (NaOH)	80-100 g per liter
Voltage	6
Time	1 min

Pickle—The work is etched in approximately 20 pct hydrochloric acid at room temperature for 1 min.

Silver Strike—High free cyanide and low metal content. The operating limits of the bath are:

Sodium cyanide (NaCN)	30-40 g per liter
Silver cyanide (AgCN)	1.5-2 g per liter
Voltage	6
Time	1 min

The electrical circuit is completed before contacting the silver strike bath to prevent an immersion non-adherent deposit. The copious evolution of hydrogen⁸ acts as a final and efficient cleaner. The bath is operated at room temperature.

Lead Alloy Bath—The lead alloy fluoborate bath has the following composition:

Cu	1-3 g per liter
Pb	100-110 g per liter
Free HBF ₄	35-45 g per liter
Sn	11-13 g per liter
Resorcinol	4-5 g per liter
Gelatine	(add as needed)
Current density	20
Min per 0.001 in.	21

Lead-Tin Flash—Same as lead alloy except omitting the copper.

Heat Treatment—The plated material may be heated in an oil bath at 320 to 340°F for an hour to check the adhesion of the deposit or annealed for a longer period of time to modify the structure.⁹

All the plating baths are filtered periodically so that any colloidal or insoluble particles do not accumulate in the electrolyte to a sufficient concentra-

tion to cause roughness or poor adhesion in the deposit. The cleaner and etch tanks are emptied frequently to insure efficient chemical action on the work.

The development of racks for uniform metal distribution has been, and still is, the outstanding problem of precision plating. There are basically three procedures for controlling the thickness on various surfaces of the cathode other than the principal plated surface. They are: (1) To mask all surfaces except the area to be plated by any convenient material such as wax,¹⁰ lacquer,¹¹ plastic or rubber molds^{12, 13}; (2) to use electrical conductors to con-

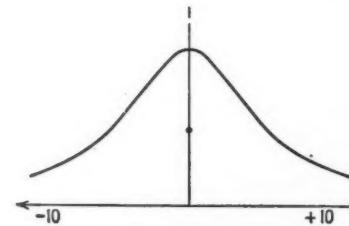


FIG. 1—Current distribution over the plane in the point-plane problem. Point electrode situated ten units away.

trol or eliminate the plate on undesirable areas by the well-known rubber or thief; (3) to control the resistance to the various areas of the cathode so that they plate at different current densities, and thus in one operation obtain the respective thickness required on all areas of the cathode.

In addition, the racks are suitably designed to obtain uniform current distribution on the principal surface to be plated. The particular rack and masking procedure actually used depends on a number of factors, such as quantity and tooling time. In general, precision racks are developed which require no manual masking if the production justifies the tooling costs.

The outstanding problems associated with the successful production of a precision deposit are the surface finish or the appearance of the deposit and the dimensional uniformity. The solution of these problems is in no small measure dependent on the current distribution throughout the entire area of the cathode. Automatic plating equipment and racks have been developed from the theoretical current distribution data published by Kasper.^{14, 15} These theoretical data involve only current distribution. Recently Kronschein¹⁶ made a theoretical study of the current distribution on the inside of cylinders based upon Kasper's equations. He likewise did not take into account the polarization effects of the electrodes. A completely adequate equation must include polarization and cathode efficiency.

In a recent article,¹⁷ accurate experimental data were collected on various plating baths and were compared to Kasper's theoretical derivations for the case of the variation in thickness of the deposit on the inside of eccentric cylinders with an internal anode. In general, the data did not contradict Kasper's general equation for the current distribution between two cylinders. However, each individual metal gave its characteristic deviation from the theoretical current distribution equation, which was to be expected, since the polarization and cathode efficiency of the individual baths varied widely. For example, the experimental data for chromium and zinc (acid) approximate the theoretical current distribution curve. The throwing power, as measured with the Haring¹⁸ cell, on these baths approaches

zero. However, on the other hand lead, copper (acid), silver, and tin (stannate) show increasing derivation from theoretical current distribution curve and their throwing power likewise increases progressively as measured with the Haring cell. In a recent publication,¹⁹ the current distribution along a cylindrical anode inside of a concentric tube was experimentally checked with theoretical data and was found to be in close agreement for chromium plating.

Another point to be considered when applying data of this type to actual operation is the current density employed, for it can be readily demonstrated that the lower the current density the more eccentric the two cylinders may be to obtain a plate thickness within a given set of dimensional tolerances. In actual production, a cathode 2½ in. inside diam to

FIG. 2 — Current distribution over the plane when the plane is bent at a right angle and the other electrode is a parallel line.

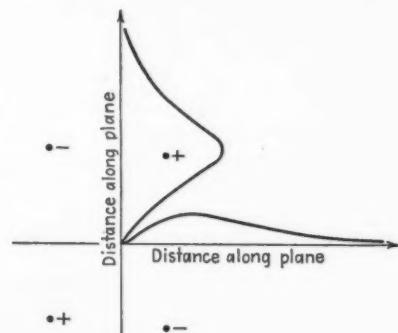


plate within 5 pct from a 5/8 in. diam anode must be located within $\pm 1/32$ in. of the common center for lead-tin-copper (10 pct tin) plated at 20 amp. per sq ft from the bath and operating conditions referred to earlier in this article. The tolerances vary directly with the diameter of the cathode if the anode is fixed. This type of rack design is used for plating sleeve bearings and certain types of half bearings. In general, however, half bearings are plated from specially designed shield-type racks for an automatic conveyor with external anodes. The actual design has patents pending.

However, to understand the operation of baffles or shields for controlling metal distribution on the cathode, the theoretical discussion given by Kasper¹⁴ is helpful. The current distribution over the plane in the point-plane problem is illustrated in fig. 1, which shows that the current from a point to a plane varies inversely as the square of the distance. This case has been experimentally confirmed by Joubin²⁰ with neutral copper sulfate under conditions of minimum polarization.

Again Kasper has developed the case for current distribution in a right angle with a line electrode which is conveniently illustrated in fig. 2. It is noted that the current which enters the corner is zero. The original article has a theoretical discussion of this point for those interested in the mathematical solution.

The author has never been able to find experimental quantitative verification of this case in the literature, but qualitatively every plater has been faced with this problem. Lowering the current density to prevent burning of the deposit on edges and corners of deep recesses is a practical answer. This point is further described by Pinner²¹ on nickel plate distribution. In plating of flanged silver bear-

ings, qualitative data collected over a number of years have shown that to deposit silver uniformly on perpendicular planes a fillet must be used. It has been demonstrated by microsections that as a true right angle is approached, the plate thickness variation resembles the theoretical curve shown in fig. 2.

In practice the cathode which is plated is a semi-circle and is geometrically somewhere between the point-plane problem and the conducting quadrant right angle problem. The reference points on figs. 1 and 2 show that current distribution varies from a maximum to zero. Since current distribution roughly represents metal distribution in the practical plating range, one can readily see that a semi-circle is somewhere between these two extremes. Another condition which must be satisfied is to have the anode located a great distance, mathematically speaking, from the cathode. Again this is usually fulfilled in all common plating circuits. For design purposes the cathode may be considered an infinite number of parallel circuits with the current distributing itself inversely proportional to the square of the distance between the electrodes. The insulating shields between the anode and the cathode can be conveniently employed for increasing the apparent distance between the electrodes at their nearest points or areas which tends to equalize the current density on the cathode.

The general principles of insulating shields for qualitative control of metal distribution is well known.²² However, the quantitative control of metal distribution which is the result of uniform current density throughout the cathode must be developed experimentally for each geometrical shape. In practice the design of the insulating shields must be of such a shape and contour that they deflect current density away from the normal high current density areas and increase the flow of current into the normal low current density areas. In some cases dipoles²³ can be conveniently used for bell-shaped cathodes.

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A New Process For

Electropolishing Silver

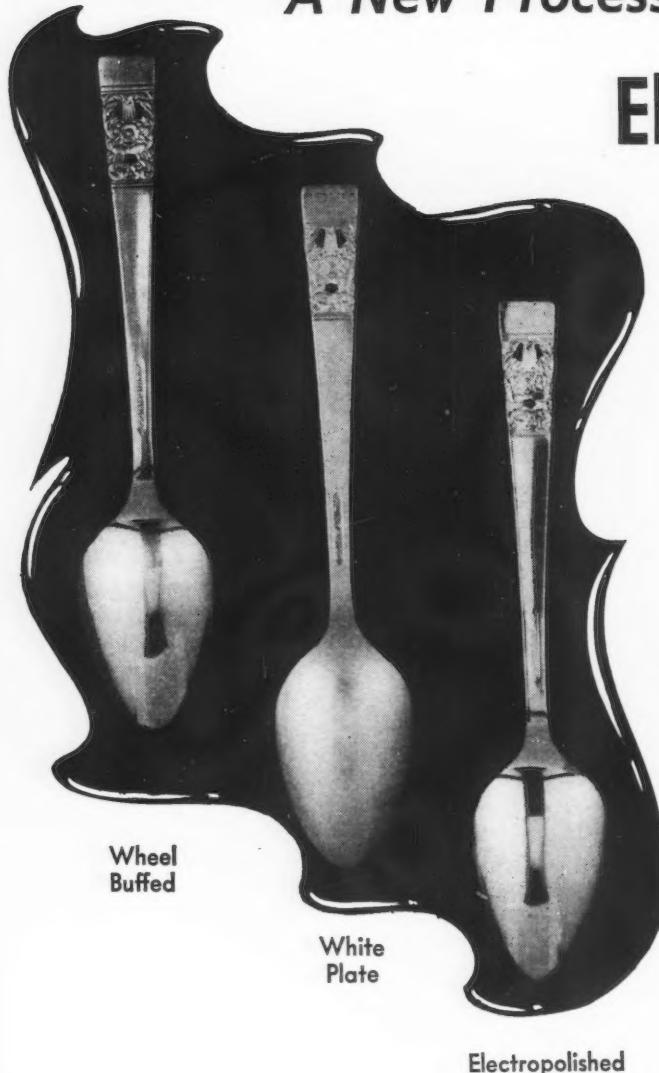


FIG. 1—A comparison of the finish produced by the new electropolishing method and that obtained by the use of the buffing wheel only. Spoon on the left has a normal buffed finish, the finish on the center spoon is as it comes from the plating bath, before polishing. The spoon on the right has been electropolished by the new process, with no after treatment.

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A process for electropolishing silver which greatly facilitates finishing operations and which usually eliminates the primary buff is described herein. The process, which employs a current in a direction opposite from that employed in normal plating, is performed in an alkaline cyanide bath, without removing the parts from the original plating racks, and results in a complete polish up to mirror brightness.

DIRTY and expensive hand buffing is ordinarily required for electroplated silver to bring its milky white surface up to mirror brilliance. In addition to this primary buff with abrasive rouge, the trade usually demands some special finish or color which can be obtained by a final light buff using alundum, carbon black, or similar material. A new electropolishing process, developed at the research laboratories of Arthur D. Little, Inc., Cambridge, Mass., under the sponsorship of Oneida, Ltd., Oneida, N. Y., makers of flat and hollow silverware, greatly simplifies the finishing of silver and usually eliminates the primary buff entirely.

This process, which involves passing a current in a

direction opposite to that employed for normal plating, is performed in a final bath immediately after plating and while the silverware is still on the plating racks. It can give a complete polish up to mirror brightness. At Oneida, this is considered too bright a finish and electropolishing is carried only far enough to eliminate the heavy rouge buffing. A final touch with a coloring buff is used to give the various finishes to which the trade is accustomed. Fig. 1 shows a spoon which has been electropolished to mirror brilliance by the new process, compared with a spoon with the normal finish obtained with a buffing wheel, and a spoon as it comes from the plating tank before polishing.

Electropolishing in general is a relatively new finishing technique in which the article to be polished is immersed in a suitable bath and electric current is passed in the opposite direction to that employed in ordinary electroplating. The high spots of the metal surface dissolve preferentially to produce a smooth mirror finish. Development in the past 10 years has been rapid and many electropolishing processes are

now in use, particularly for stainless steel. Most of these processes use strongly acid baths.

The new process, on the other hand, uses an alkaline cyanide bath. It has been in regular use at Oneida for well over a year and a number of advantages have been found. Buffing costs have been reduced and quality improved. On a typical item, electropolishing has eliminated rouge buffing and reduced total finishing costs to 50 pct of that formerly required for buffing and coloring. A better quality plate is produced with elimination of cut through edges, which usually result from too zealous buffing. A slight measure of tarnish resistance seems to be imparted to the silver surface, providing it is not subsequently buffed, but in the present manufacturing schedule this advantage cannot be utilized. A general view of the process and operation at the Oneida plant is shown in fig. 2.

Processing Technique

Typical operation of the new process is as follows: Spoons (or knives, forks, etc.) are mounted in the usual manner on racks and given an electroplated coating of silver using a typical cyanide bath. The spoons are then lifted from the plating bath directly, without an intermediate rinse, into an electropolishing bath which is part of the regular automatic plating line. A typical electropolishing bath contains the following, although rather wide variations may be used:

Silver: 4 to 6 oz Troy, metallic Ag per gal, added as KAg(CN)₂

Potassium cyanide: 4 to 5 oz avdp, per gal

Potassium carbonate: 6 to 8 oz avdp, per gal

A potential of about 2.7 to 3.5 v dc, depending on the area of the work and other operating conditions, is applied to the bath making the article anodic and using silver or other metal as a cathode. The ratio of electrode areas is not critical but the ratio of 1:2 anode to cathode area is convenient. At the above

voltage a current density of about 12 to 18 amp per sq ft is maintained for about 20 sec while the work moves approximately 10 in. through the bath. The spoons are then automatically withdrawn from the bath, rinsed and dried. They are now ready for final light buffing and coloring. Only about 1 or 2 pct of the silver is removed, compared with up to 5 pct by rouge buffing, and silver is removed more uniformly, without cutting through the edges.

Controls for the bath are simple and involve only the periodic analysis for silver, free cyanide and potassium carbonate which is a normal routine for any silver plating bath. Anode and cathode efficiencies are high; thus bath composition changes very little with use. Because of its low viscosity, compared with some acidic electropolishing baths for other metals, the loss of solution clinging to the surface of the work upon withdrawal is minimized.

Electropolish Other Metals

Although this method of electropolishing using the alkaline cyanide bath has been developed to the commercial scale only for silver, other metals have been polished in similar baths on a laboratory scale. Silver, cadmium, copper and alloys of those metals such as sterling silver, brass, etc., have all been polished but, except in the instance of silver, none has been polished commercially. As in most electropolishing processes, each application requires special tailoring for optimum results.

A patent (U. S. No. 2,416,294) has recently been allowed on this cyanide electropolishing process and others are pending. Oneida, Ltd. holds rights in the field of silver and consideration is being given to licensing other silver processors as soon as necessary controls for the process have been worked out. Arthur D. Little, Inc. is continuing the development in fields other than silver.

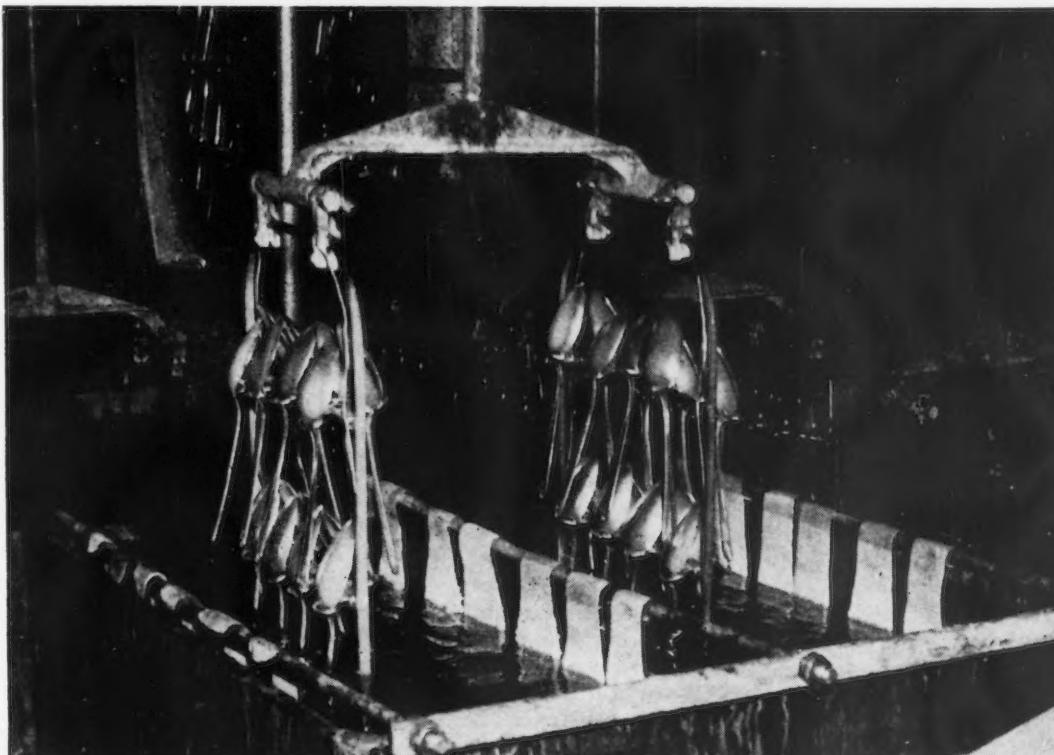


FIG. 2 — General view of the electropolishing tank at Oneida, Ltd., used for finishing silverware.



The Practical

By CLIFFORD W. KENNEDY

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HALF a century ago a man worked out the best years of his life before his financial opinions were respected. Generally the insignia of the oracle included a touch of winter in his side burns and a gray tinge at the tips of a handle bar moustache as well as an elaborate gold chain stretching across an expansive middle. Then Roger Babson appeared with his charts and statistics and showed how to project sensible forecasts of business trends from the recorded events of the past. Facts and statistics supplemented experience and lowered the age limit for business judgment.

Intensive courses in math and the pips on the radar screen made relatively skilled navigators of young lawyers and haberdashers soon after Pearl Harbor. We might still be repelling the Japs at the Rocky Mountains if the Navy had waited for young ensigns to finish out the old-fashioned apprenticeship before the mast.

From World War I we got mass production and the "efficiency expert." The bell began to toll for the old time craftsman. Also along with Harding Normalcy and Coolidge Prosperity and the adolescence of this century's scientific and technological development there commenced a slackening in quality standards.

Probably few thought it through profoundly, but the rash of manufacturers' written guarantees was a certain indicator of the letdown in product reliability. These guarantees were an unconscious defense mechanism, the red herring drawn across the path or the camouflage concealing the true underlying condition. You bought phonograph, pen or pipe and got with it an engraved document, some as elaborate as college diplomas, attesting the manufacturer's reliability and

his contract to correct free of charge and cheerfully any defects in workmanship or material appearing in the product during the first year of its use.

During this same pre-Hoover era a small group of Western Electric engineers and mathematicians dreamed of putting statistical methods and the laws of probability to work on quality and scrap problems. They knew somewhat of the mathematical basis on which the insurance actuary computes the chances of your living to be a patriarch. They reasoned that if the professional gambler could successfully calculate the odds for or against his winning or losing in a chosen situation, a similar technique could be employed to estimate the condition of manufactured goods.

While they made several rather astonishing discoveries in the field of practical industrial statistics and product quality audits, little or no general use was made of these really effective management tools for a number of years. Westinghouse and General Electric engineers picked up the general idea, but on the whole it simmered along until World War II uncorked its unprecedented pouring out of material.

Then service procurement agencies found themselves faced with deliveries not only of a huge variety of products but also of quantities that ran into millions and hundreds of million pieces.

A single example of the success of quality control methods in solving the Gargantuan acceptance problem is contained in one of the Army Ordnance reports. On the one hand Ordnance procurement found the steadily mounting pile of goods waiting to be tested for effectiveness, safety and specification requirements. On the other hand draft boards were consistently sucking out valuable personnel. So Ordnance turned to quality control. One particular operation, for instance, required 42 inspectors per \$1 million worth of material when quality control was introduced. Long before the year passed this staff had been safely cut to 12 inspectors per \$1 million worth.

How does the quality picture look today? Mass production and assembly lines are still with us. So is the efficiency expert to a considerable degree, though a

Aspect of

Modern Quality Control Methods

Much discussed but little understood, quality control represents an outstanding opportunity for reducing manufacturing costs by elimination of scrap and in assuring happier customer relations. In this article the author presents a practical down-to-earth appraisal of quality control methods and explains in non-technical language what quality control is, how it affects costs and how it can be put to work for management without the necessity of elaborate preparation.

more intelligent one. Between automatic machinery, methods engineering, time and motion study and other technical developments, the tendency to make a robot of the worker still prevails.

The happy result of course is that we get more products and everybody has more spare time and money. Our living level is improved. But the industrial patient is unhealthy. An important vitamin is lacking. We ladle out industrial relations for a tonic, but it substitutes poorly for the basic incentive of pride in workmanship.

A natural reaction to the prolonged war pressure arrived in the form of the general letdown. Worker morale in spots dropped through the floor. We are finishing a buying and loafing spree; the spirit of the 52-20 club lingers in the air. Jobs are plentiful. The worker feels that if worse comes to worse paternalistic governments will take care of him. He has realized the power of collective action. So, all in all, his tendency is to slight or belittle the present job. If his work is poor, he knows he can still get away with a *so what* attitude.

Again very sketchily, so much for the present, a present whose duration is difficult to foretell. But the future, when it arrives, how will it affect the quality angle? One sharp image appears in the crystal ball. Less work for more money. In other words, whatever you make will cost more. Collective labor action may well soak up whatever gains are devised from reducing overhead, taxes and sales expense or by the invention of labor saving devices and methods. More than ever before it is going to be necessary to do the work right the first time. Little margin will be left for inspections, sorting, rework, salvage, selective assembly and similar stratagems. The scrap report may well parallel the profit and loss statement.

Another pincer movement has already taken shape—the buyer's market. Twilight is falling on the day of the \$10 cigar, \$100 for a ringside seat and \$1000 for a doubtful \$200 worth of automotive junk. The customer too has tried the effect of collective action. Furthermore, the war taught him that ammunition, guns, planes and even ultraprecise bomb sights could be made not only dependable and defect free but also

in quantities. The product that offers better quality for the same dollar will head the customer's list in the coming competition.

Many present defensive measures in manufacturing naturally tend to engineering and technical improvements. Paratroopers in the form of research men are being flown in beyond the enemy's lines as fast as squads can be collected and trained. Mechanization and high speed machinery are planned to compensate for declining worker interest.

What has quality control to do with all this?

First, perhaps, quality control should be given some degree of definition. Like work simplification, industrial relations or electronics, its borders have not yet been fully explored nor accurately mapped. Quality control is considerably like an adolescent; it has not reached full stature nor have its features set into the final adult physiognomy. At present it might be called a specialty, a system rapidly maturing into a science. While it started out 20 years ago as "Statistical Methods of Quality Control," it has absorbed and is fast assimilating all the techniques that might claim to do with the control of quality, scrap reduction, elimination of manufacturing losses and the improvement of product reliability.

The words *quality control* have had a sort of magical ring, like sulfa or penicillin, but it is by no means a Kickapoo Indian cure-all. It must be intelligently prescribed and administered. One of the main features of quality control as a system, technique or science is its recognition of variation among things. Then it measures, analyzes and evaluates this variation.

The man who walks a tightrope across Niagara must place his feet literally "on the line"; strolling along 5th Ave. he can wander a bit from side to side without any more physical danger perhaps than a jostling.

No machine yet devised produces pieces exactly alike, and the best planned assembly line will contrive defective merchandise. Positive duplication seems to be contrary to the laws of nature.

Of themselves, variations among things need not bother us. The general condition is recognized in manufacturing by the term "tolerance." To ask for a pair

of shoes "like I have on" does not necessarily imply too critical a comparison. The degree and extent of variation, the extremes, are what make the trouble. A difference of 0.1 in. in the lengths of the links of your watch chain may actually enhance its artistic value but a variation even of 0.00001 in. in some of the elements inside the watch make it a worthless inaccurate timepiece.

Here is where the quality control specialist comes in. His job is to measure the variations in manufacturing processes and intelligently interpret them. Like Babson he makes considerable use of charts and graphs to portray his findings and to forecast trends at a glance. Unlike the ward boss with his ear to the ground, the trained quality control man samples scientifically and takes a "Gallup Poll" of an operation. He has learned to calculate the odds with mathematical precision, judging from a minimum of observations, as to whether a shipment, lot or batch fulfills speci-

sample of ten were considered uniform and satisfactory. A point falling below the "lower limit" indicated a "cold" batch; those points above the upper limit pointed out a "hot" series of appliances. The precalculation of the limit lines took full cognizance of course of the odds for or against any sample failing to reflect the true condition of the lot or batch.

The batches represented by the sampling points falling outside the limit lines were withdrawn and given 100 pct tests and the defective units were called out.

Results of the sampling plan and the quality control chart were (1) an estimated direct saving of \$80 per day in testing, handling and rebuffing costs, (2) elimination of the testing bottleneck increased general production 10 pct, (3) a tendency on the part of the assembly crew to want to keep on the mean or standard, and (4) a truly uniform product reaching the trade.

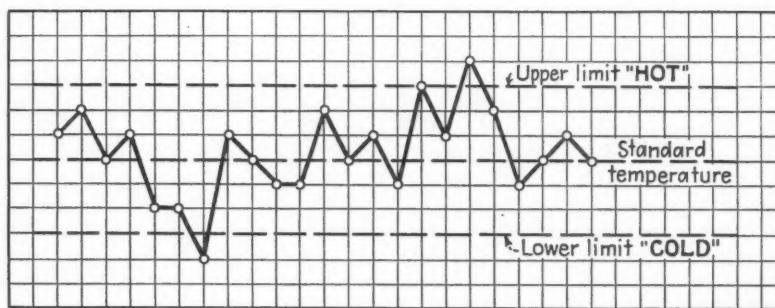


FIG. 1—An example of a simple quality control chart to show the degree to which a product exceeds upper and lower limits of acceptable quality.

fications or not. Thanks to the accurate mathematical-statistical framework of modern quality control methods, he need not be necessarily gray bearded or portly from years of experience.

An example of the technique implied is illustrated in fig. 1. Here is the case of the manufacturer of an electrical heating appliance. His product was designed and rated to heat up to a certain temperature at a given watts input. Some variation from the capacity advertised on the nameplate was expected. Trouble came however from those that heated up too furiously and burned out in a noticeably short life span. Others lacked pep. They were "cold" and, like stoves that don't draw, only a source of exasperation to the buyer.

With these appliances flowing through an assembly line in lots of 100 the interruption necessary to throw each one on the line to heat up and then cool off bottlenecked the whole shop. In addition the prolonged heating test subdued the original high finish—some actually blued and tarnished—and each unit had to be carefully buffed again.

The quality control specialist sidetracked ten heaters at random from the assembly line about four times a day for test. He recorded the variations in temperature and input among the ten and made a certain statistical calculation of variation. This result he plotted on a chart.

If the plotted points fell between precalculated "limit" lines or values (see fig. 1), the heaters produced during the period represented by the sidetracked

A ball-bearing manufacturer tossed money away in his automatic screw machine department to the tune of scrap and rework running between 4 and 24 pct and averaging 14 pct daily loss. Part of the job of revamping this situation included a typical quality control survey. One graphic example selected from 68, six-spindle machines working on three shifts is shown in fig. 2.

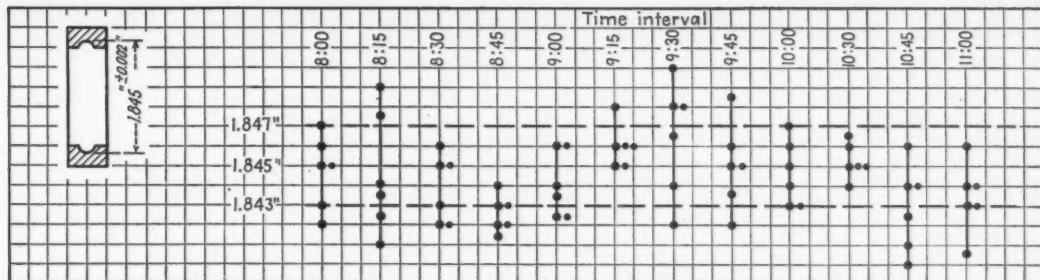
Immediately the logic and benefit of systematic inspection appear. It is always possible to take a piece from a machine now and then, measure it, and hazard a guess as to the amount of out of tolerance work showing up. Maybe. Some oldfashioned guessers prefer to base judgment on the inspection and measurement of a handful of parts at a time.

But notice from fig. 2 that exactly six pieces were taken from the machine and at regular 15 min intervals. This represents the first step in systematic quality audits.

The next step in the system consists in tallying the dimensional variations between the six pieces in logical order, as in fig. 2. From such a tally, in which the message each sample offers is represented by a vertical row of dots, a picture is obtained of the way the machine was producing at that particular interval. The uniform succession of samples and the vertical rows of dots complete the picture of what happened in the batch of work produced during several hours. A chart like the one in fig. 2 forms a newsreel of the operation.

No special engineering or statistical ability nor even

FIG. 2—The first step in setting up a quality control program is to determine accurately the degree to which a product varies from acceptable limits. This chart depicts the variations of six items selected at 15 min intervals.



long shop experience is needed in order to understand the chart. Even the amateur can appreciate that the piece by piece diversity is too great though the operator religiously attempts to hold the machine on the mean.

As has been said, a function of the quality control method is to measure variations in an operation, interpret them, and, what is most essential and profitable, determine how far those variations can be safely allowed to proceed before an operation is liable to produce out of tolerance work. These restrictions that can be determined by quality control methods are like the white lines on the highway. You may not get into trouble if you just happen to slide over one a little, but if you go over them too far or too often you probably end up in a crash.

Compare fig. 2 with the chart in fig. 3. The machine has been overhauled and tightened, attention has been paid to chucking, tightening tools and cams and an effort has been made to secure more uniformity in the tube stock from which the ball races are made. If the work begins to act up as shown at *B*, fig. 3, the tool setter steps in to find out why. If the work swings toward an out of tolerance condition as at *C*, the operator resharpenes and resets the tool.

Action in time is another important product of a quality control chart. Again, conversely, the operator gains upward of 10 pct in total production because he shuts down for adjustment not from the intermittent and casual examination of occasional single pieces but from the group condition report furnished by his road map, the chart. A quality control chart rarely cries wolf.

A modern quality control system is by no means confined solely to charts, helpful as that form of quality audit proves to be. It makes use also of scientific sampling plans based on the mathematical laws of probability, plans thoroughly proven over years of use.

Suppose you made automobile distributor parts. You have a room full of girls inspecting every one of the thousands of finished parts and eating out the heart of your profits. Suppose you discovered—as you would if you made an unbiased study—that in spite of the 100 pct inspection crew, defective parts and assem-

blies crept through in steady percentage to your customers.

You could set up inspection stations where about 10 pct of each batch would be sampled for defects. Any batch meeting certain quality control sampling restrictions would be sent on to the shipping room without further sorting. But those batches that did fail at the sampling test would be screened 100 pct before leaving the inspection station.

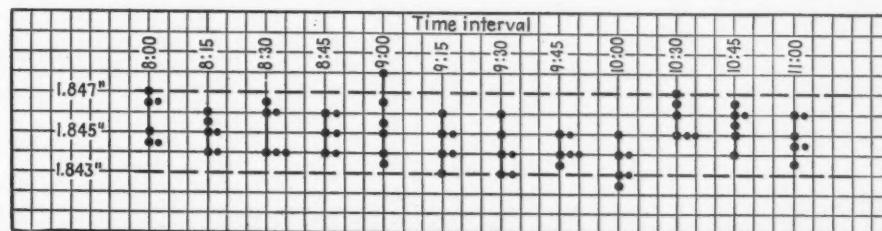
The total pleasant result would be shipments with defect contents below any reasonable prescribed and pre-established level (like $\frac{1}{2}$ of 1 pct) and an inspection cost approximately one-third the previous total 100 pct effort. In other words, adopt a modern sampling-screening system and chop 66 pct off your final inspection burden!

An efficient quality control system carries other gifts in its bag. It invariably reveals the penalties of inadequate preventive maintenance on machines and equipment. It leads to the discarding of absurd tolerances and specifications and to a profitable revamping of materials, tools and equipment. Quality control studies frequently reflect back through to product design and point out previously unnoticed practical revisions.

The well-rounded quality control program embraces much more than the mathematic-statistical phase. Such things as a little paint, cleaning up, housekeeping in other words, better lighting or ventilation—the list is legion—all affect quality favorably. Or providing the operator with better gages and measuring equipment. If scrap runs high, give thought to teaming quality control and incentive engineers. The quality effort, like a safety campaign, can well include certain psychological, publicity and promotional elements.

Best of all, a trial of modern quality control systems and statistical techniques can be had at relatively little expense. They involve no investment frozen in new and previously untried equipment. At the most you need only to tie up one personable, practical man who has a reasonable engineering and manufacturing background (plus possibly one assistant) for a matter perhaps of 6 weeks before you have the answer to whether or not you can afford to ignore the need of this profitable technique in your organization.

FIG. 3—The same production as covered by fig. 2, but after necessary corrective steps had been taken.



Requirements

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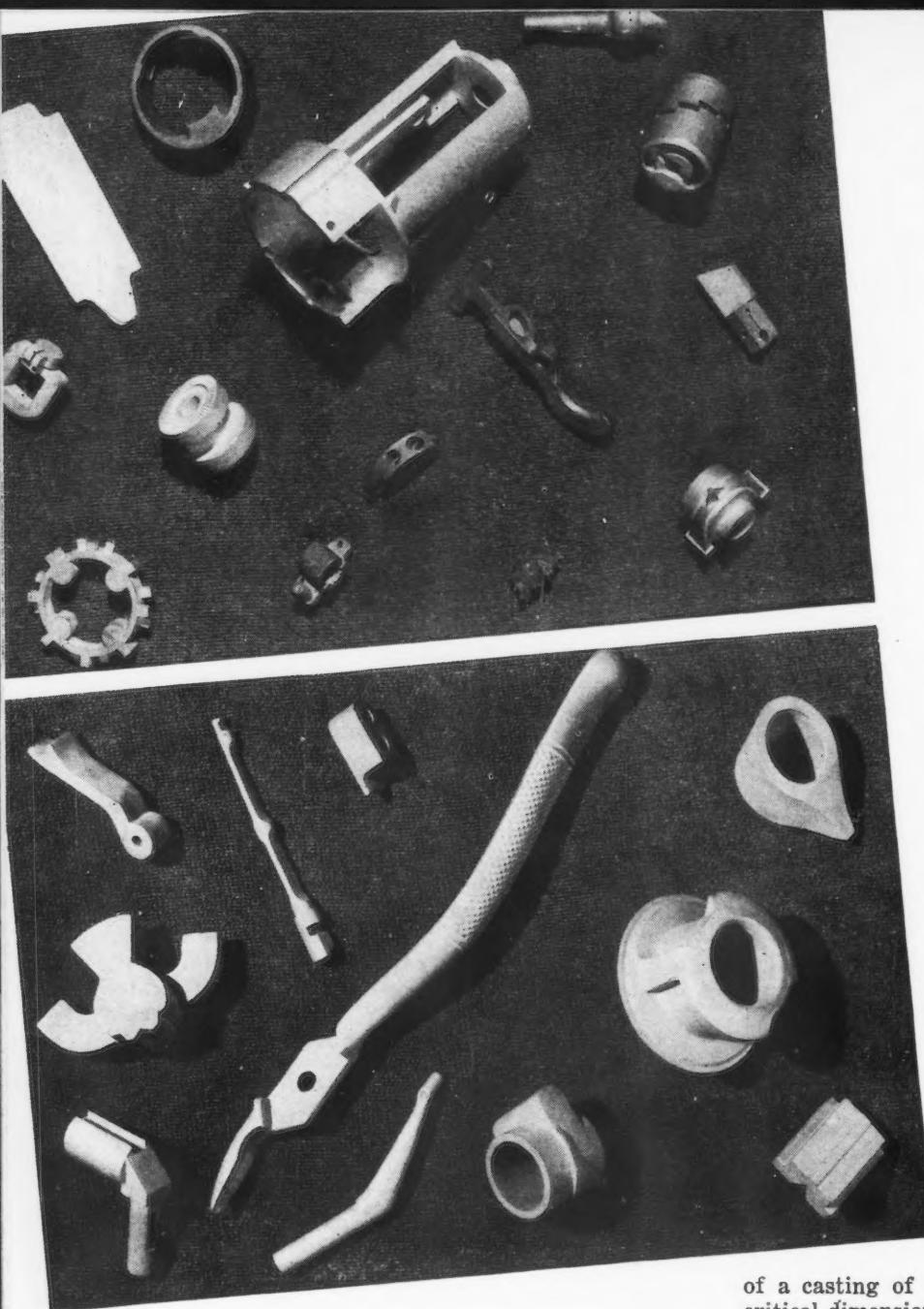


FIG. 1 — Typical precision investment cast parts. The top group of parts are in nonferrous metals. The lower group are all ferrous parts. Photo courtesy (upper) J. R. Wood Products Corp., Brooklyn, and (lower) Precise Casting Div., Cooper Alloy Foundry Co., Hillside, N. J.

THE process of precision investment casting, often referred to as the lost wax method, was developed largely during World War II to make various parts difficult to produce by conventional methods. Experience gained in wartime production is now being successfully applied to peacetime uses. Some typical parts produced by investment casting are shown in fig. 1.

As a wider understanding and a more complete technical knowledge is reached of the possibilities this process holds for peacetime applications, a growing number of executives are giving thought to either the development of a precision investment casting department as an adjunct to a manufacturing plant, or the establishment of a casting shop for custom production. This article is designed to provide information of a general nature¹ for such engineers and executives, covering the technique of precision casting, equipment needed, and capital and labor requirements.

The process, briefly stated, results in the production

of a casting of undercut or intricate design and of critical dimensions. The first step is to make a die in which patterns of the piece to be cast may be formed in wax or other volatilizing material. These patterns are grouped together and are embedded or invested in a refractory material, referred to as the investment. The investment is hardened to form a mold and then put through a heat cycle. This results in the melting or burning out of the expendable pattern and the preparation of the refractory mold to receive the molten metal. The metal is cast by centrifugal action, or other forceful means, so that the mold is completely filled and a strong dense casting is obtained. The refractory material is then broken away from the casting and cleaning operations are carried out.

Dies for producing the expendable pattern are usually made of metal, either a low fusing alloy, or steel. The machined steel dies have a greater initial cost and require machining experience of the highest sort. Soft metal dies may be made more easily and inexpensively by forming metal in segments around a master pattern. A hydraulic press, of the type shown in fig. 2, of 10 to 20 ton capacity is used to form the

for Setting Up a Precision Investment Casting Plant . . .

The steady flow of questions received by the editorial staff of The Iron Age for basic information on the precision investment casting process indicates a lively continued postwar interest in this method. While certainly not a cure-all for all industrial production problems, precision casting does possess certain inherent advantages which can be favorably adapted to peacetime uses. This article briefly reviews the process in general, describes some of the newer equipment developed specifically for the process, and explains the labor and capital requirements for setting up a casting plant.

die. The crude sections, formed by pouring the soft metal over the master pattern, are pressed together around the master pattern to form an accurate die. While these dies do not have the initial cost of steel dies, they will not maintain dimensional accuracy over as long a period. Dies should be prepared for easy direct extraction of the expendable pattern and rapid closing for further injection.

The principles of injection molding apply to forming the expendable patterns. Machines have been developed to produce particular pieces, where long runs are to be made. In other instances, custom casting firms have engineered and developed their own machinery to produce expendable patterns covering a wide range of sizes. Standard equipment on the market includes small air pressure and air-hydraulic injectors. These have proven satisfactory for small pieces.

In general an injection machine should provide a means of maintaining the pattern material at controlled temperatures, of injecting this material under

¹ Other articles discussing specific phases of precision investment castings, published in THE IRON AGE, include the following:

"Precision Casting by Lost Wax Process," July 9, 1942.

"Precision Casting of Turbosupercharger Buckets," Feb. 10, 1944.

"Industrial Precision Casting by a Manufacturing Jeweler," Sept. 7, 1944.

"Equipment and Material for Precision Casting," Nov. 9 and 16, 1944.

"Refractory Molds for Precision Casting," Feb. 8, 1945.

"Precision Casting of Low Alloy Steels," June 21, 1945.

"Precision-Cast Copper-Base Alloys," Nov. 1 and 8, 1945.

"Precision Casting with Plastic Patterns," Nov. 15, 1945.

See also "Industrial Status of Precision Casting," American Foundryman, October 1945; and "Fundamentals of Industrial Precision Casting," a publication of the research department of Kerr Dental Mfg. Co., Detroit.

pressure into the mold, and of holding the mold closed during the injection cycle. Automatic opening and closing of the mold is a most desirable added feature. The pressure should be high enough to hold shrinkage of the pattern material to a minimum, it being understood that higher pressures permit using the material

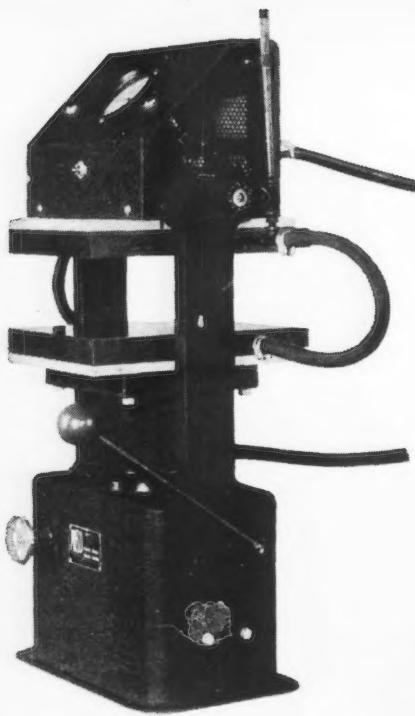
at relatively low temperature in a soft rather than fluid state. A machine meeting these general conditions has been built and is being introduced to industry.

At the present time most patterns are formed individually and the next step is to assemble them on sprues and gates prior to forming the refractory mold. Pattern making injectors should be developed to form patterns in gangs, although this is difficult to arrange for some undercut pieces. The usual practice is to mount the patterns on expendable wax rods and stand these on a mound of wax. This may be in turn on a sprue base of rubber or metal. The shape will be tree-like or otherwise formed to facilitate the flow of the molten metal from the base to the work at the extremities of the branches.

The groups of patterns are now ready for investing. The refractory mold is prepared in accordance with directions of the manufacturer of the refractory material. Complete even mixes are a prime requisite and machinery is available to handle batches of all sizes. Amounts to be mixed will be limited by the number of patterns to be invested at any one time and by the length of time that the semi-fluid refractory material may be exposed to the air without setting. The best practice requires either vacuuming the mixture to remove excess air or precoating the patterns to assure smooth finish on the castings. Choice of procedure, vacuuming or precoating, will depend on the particular investment or refractory material used. A typical vacuum unit is shown in fig. 3.

Molds are formed by placing a metal cylinder, lined with sheet asbestos, on the sprue base so that the group of patterns is enclosed with a sufficient margin. Then the investment is poured on the patterns, vacuumed or vibrated, and allowed to air-set.

Commercial investments now on the market are generally divided into nonferrous and ferrous investments. The nonferrous investments, which originated with the dental industry, found extensive use in gold and silver jewelry casting work and are now being used widely for aluminum, magnesium, bronze and brass casting. The ferrous investments were developed



LEFT

FIG. 2—Twenty-ton Preco hydraulic press used to form soft metal dies.



ABOVE

FIG. 3—Kerr cabinet model vacuum unit for exhausting air from the investment mix.

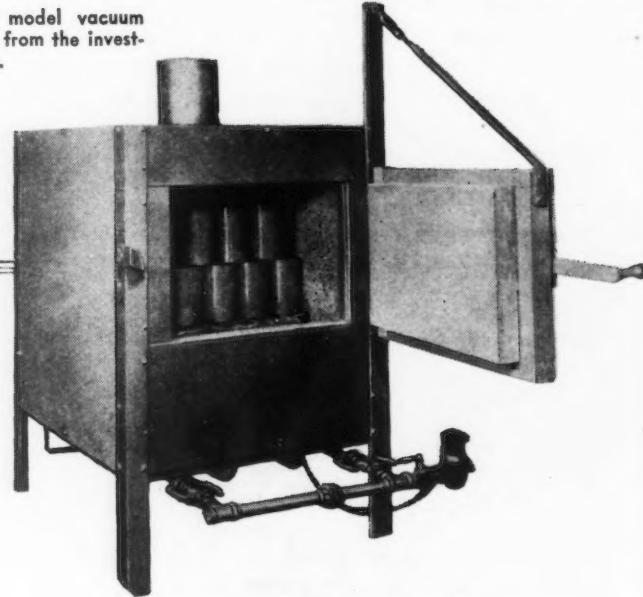


FIG. 4—Saunders oven for burning out refractory molds.

particularly to meet war needs. There had been some experience with steel alloy casting for medical purposes and also with platinum jewelry casting. Costs, in bulk, of both nonferrous and ferrous investments have been reduced substantially and efforts are being made to reduce them further.

Burning-out in a gas-fired or electric oven, which follows, has several objectives. The first and most obvious is to remove the expendable pattern from the mold, thereby creating a cavity of exact size into which the molten metal may be cast. A low heat, about 200°F, is required to melt most pattern materials, and if this does not exceed the ignition point, there may be some recovery of the material. Its re-use as anything more than sprues or gates is not recommended as the material will have lost some of its quality and will not reproduce accurate patterns. Secondly, refractory materials usually have to be put through a controlled heat cycle, to about 1300°F, in one instance, to dry them out and develop their refractory quality to the utmost. Also, it is necessary to keep the molds under high heat to volatilize completely the pattern material; otherwise, molten metal may become carbonized on the surface. Lastly, the molds must be brought to a satisfactory temperature to receive the molten metal. This temperature will be such that the metal will not chill too rapidly but will at the same time result in the work solidifying first and drawing on the button or riser. Too high temperatures result in porous casting due to continued working of the metal in the mold. An oven of the type used for burning out refractory molds is shown in fig. 4.

Casting machines cover a wide range of types and sizes. No one machine is recommended to the exclusion of all others. Those which combine melting and casting have the advantage of reducing the time elapsing between terminating the melt and transferring the metal into the mold. For steel and other high temperature alloys induction melting is accepted practice. The molten metal may be cast, in some instances, directly from the melting crucible.

A newly introduced motor-driven machine (fig. 5) has the melting crucible mounted on the casting arm. When the melt is completed, the high frequency coil is dropped clear of the crucible and the casting machine is put into operation, the metal being transferred directly into the mold which is carried on the end of the casting arm. One equipment manufacturer provides a multiple coil table and a casting machine (fig. 6) which pours the metal from the melting crucible into the mold at the beginning of the cast. In other instances the metal is poured from the melting crucible into a distributing crucible at the center of rotation and so spread into two to four molds. In another type of machine (fig. 7) the mold is held at the extreme end of the casting arm and the metal is poured into a distributing crucible next to it. The transfer takes place when the arm is rotated.

Vacuum and air pressure machines have also been built to order by some firms engaged in casting. A further variation is to make the refractory mold in disk form with patterns radiating from a central riser. The molten metal is then poured into the center while the mold is being rotated on its axis.

The breaking away of the investment follows the cooling of the flask. An air hammer may be of assistance and abrasive cut-off equipment may be indicated to remove work from gates and sprues.

Castings may then be pickled, sand blasted, steam blasted or otherwise cleaned as particular conditions require. An important quality of an investment is the ease with which it can be broken away from the work. This has been given careful consideration in preparing investments for commercial use.

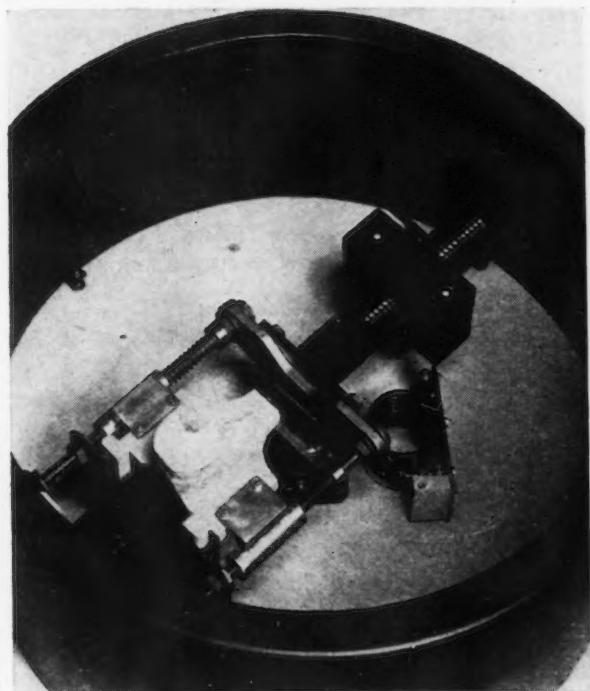
Capital and Labor Requirements

Capital requirements vary considerably. Exploratory work in nonferrous casting could be undertaken with the equipment used for jewelry production at a minimum of \$2500. The addition of high frequency equip-

critical and require close attention. Breaking open the flasks, cutting-off, and cleaning operations may be considered routine.

Diemaking is most important. Soft metal diemaking does not require great technical ability, but care must be taken to form the molds so that the pattern may be extracted without distortion.

Space requirements depend entirely on production to be attained. Minimum pilot or experimental equipment may be operated in as little as 500 sq ft. Volume production, however, requires segregation of the several stages of the process. Separate rooms are prefer-



ABOVE

FIG. 5—Ecco high frequency melting and casting machine. When metal is melted and cast is to be made, the coil is dropped clear of the arm.

• • •

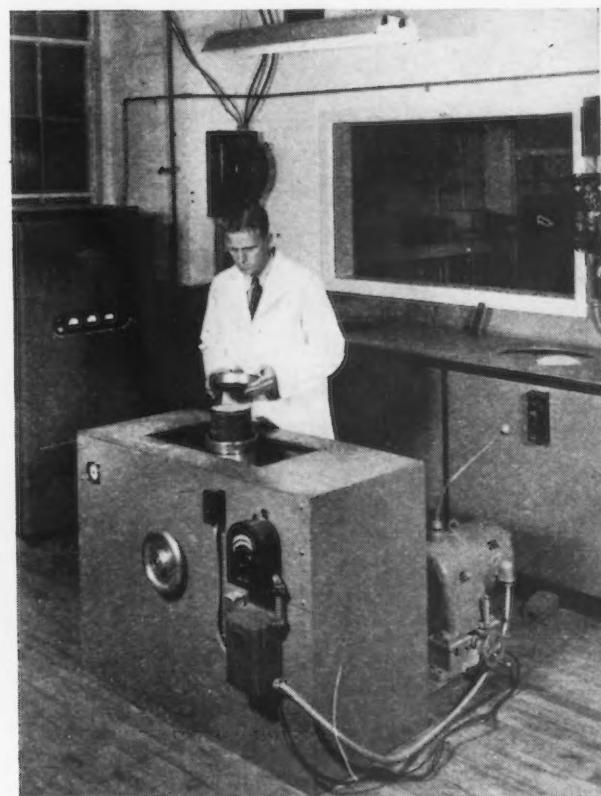
RIGHT

FIG. 6—Kerr Gyrocast unit, with coil table in background. Operator is placing cover on casting arm prior to making a cast. Melting is performed in the coil unit.

• • •

ment required for ferrous casting would double the initial outlay. For a small size producing shop or pilot installation, a capital outlay of not less than \$10,000, would most likely be necessary, and from \$25,000 to \$50,000 should be available to equip a plant for sustained production in substantial volume.

Many stages of the entire operation may be carried on by inexperienced workers, after a brief training period. Making of expendable patterns is work which can be done by women. Their lighter touch and greater manual dexterity are of advantage. Equipment should be available, however, to handle heavy molds. Investment mixing and the embedding of patterns in the mold may be accomplished easily by following established practices. Melting and casting operations are



able for different phases of operation to maintain uniform conditions. Pattern making, in particular, should be apart from investing and should be in air-conditioned space with good lighting a necessity. Investing may result in some dry powder being released into the atmosphere with ventilation to be considered. Burning out and casting operations should also be kept separate from other stages. Burn-out ovens and melting furnaces should be immediately adjacent to casting machines. In mass production the casting room should be treated as a specialized foundry; ventilation, fire protection, and other foundry practices should be observed. Breaking out of molds, cleaning of castings and sand blasting complete the casting production and should be in additional compartments to

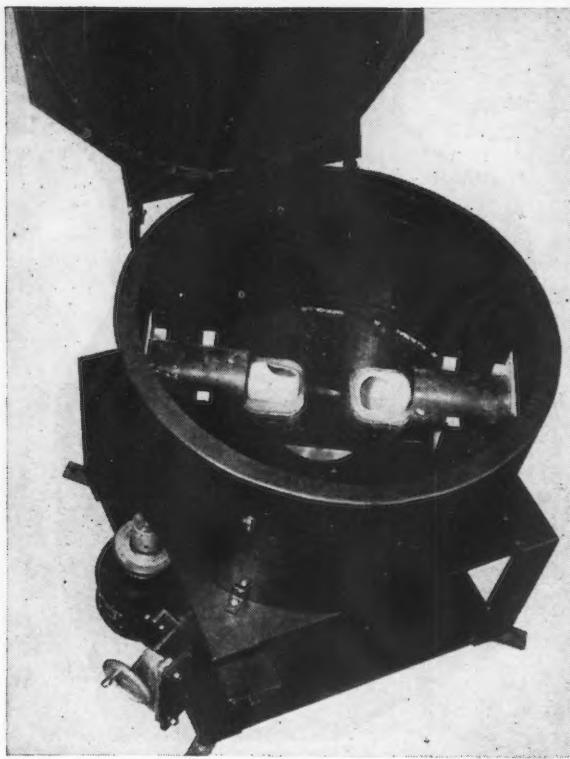


FIG. 7—Ecco casting machine for making two casts simultaneously. Molten metal can be poured in the crucible, or the metal can be melted with a torch in the crucible, then rotated for transfer to the mold.

New Books

"Bibliography on Die Casting." Bibliography includes over 3200 references covering American, English, French and German literature from 1915 through 1946 on die casting. Volume is broken down into eight separate headings covering alloys, applications and uses, design, finishing, general data, machines, process, and properties. Technical Publishing Co., 1240 Ontario St., Cleveland 13. 74 p., \$7.50.

* * *

"Work Measurement Manual." Time study procedure and work measurement investigations now being conducted by Prof. R. M. Barnes, University of Iowa, including preliminary findings, are presented in this volume. How to conduct a survey and results of two such surveys are discussed. A section is included on the use of standard motion-time data for such operations as punch presses, hand screw machines, turret lathes, sensitive drills and hand tappers. Full report of an industrial engineering survey on 80 companies employing from 50 to 15,000 people is included. Wm. C. Brown Co., 937 Main St., Dubuque, Iowa. 218 p., \$3.75.

* * *

"Plastics Molds," by Gordon B. Thayer. Third edition concerns design, manufacture and use of plastics molds. Information covers compression mold types, transfer and jet molding, mold sinking, applications of mold base standards, and molding of screw

avoid interference with earlier and more critical stages of the work.

Expendable Supplies

Supplies expended in the process include pattern making material and the refractory material. For pattern making, wax has been the usual medium. Carnauba, beeswax, burgundy pitch and amorphous wax are included in most privately controlled formulas. Plastics of the polystyrene group have also been used successfully, but production of such patterns has been an injection molding operation. A number of commercial blends of waxes are offered currently. Other precision casters have mixed their own pattern materials. When starting on a small scale, use of a generally accepted commercial blend is recommended for the sake of uniformity.

Refractory mold materials are prepared for commercial distribution by manufacturing firms who have gained wide experience over a period of years in the dental casting field. Large volume consumption has already reduced the price of these materials far below rates originally established for the dental trade. The formulas for some of these investments are protected by patents.

Some casting firms have prepared their own steel investments, but this has not appeared to keep final costs much below commercial investments. Costs of liquid binders to be used with silica sands have been high, and the need for precoating patterns offsets savings derived from low material costs.

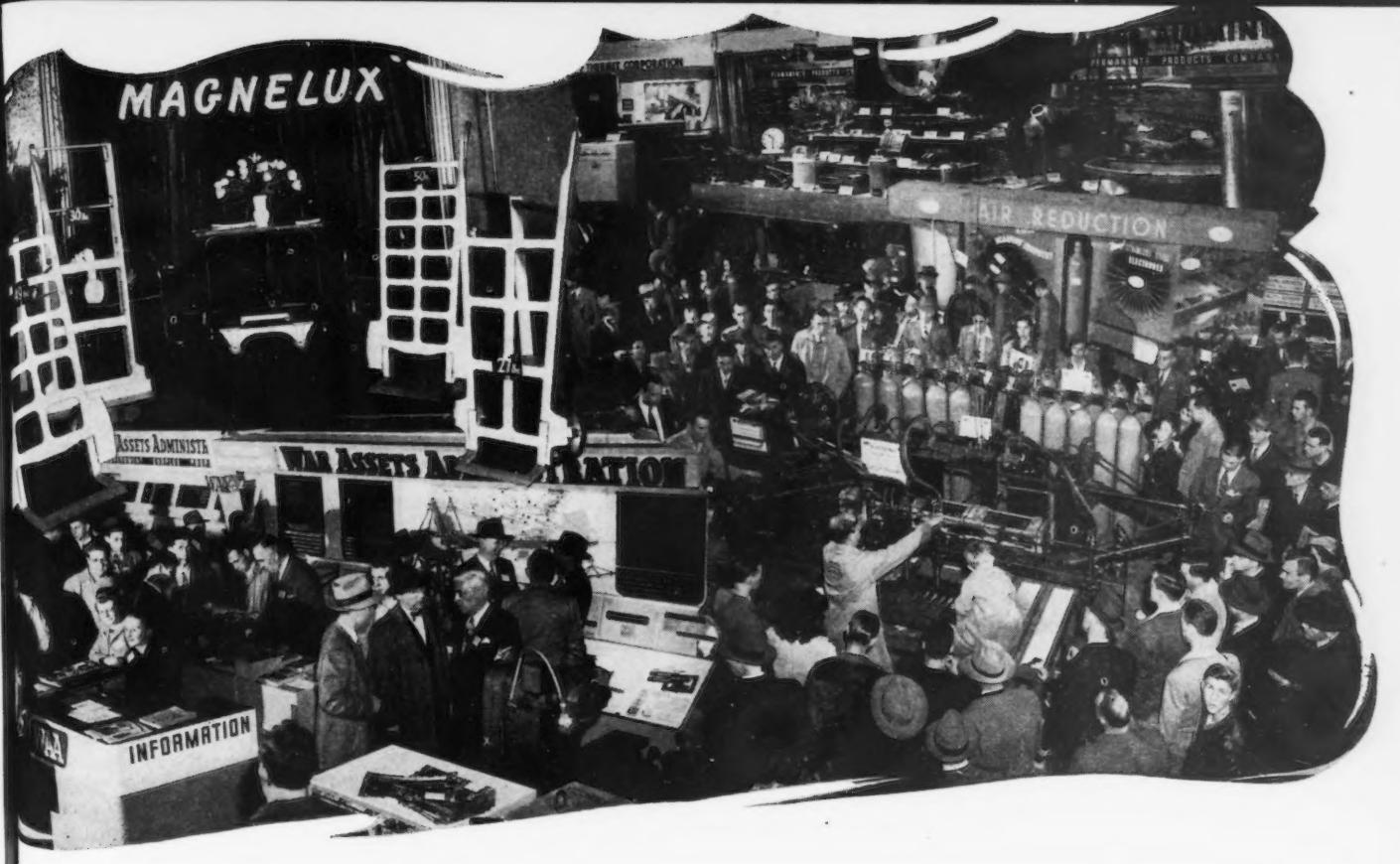
threads. One chapter is devoted to enumeration of 149 practical points in mold design and construction. Material covered in other chapters includes ejector systems for injection molds, plating, estimating costs and an enlarged nomenclature of plastic molding. Heubner Publications, 2460 Fairmont Blvd., Cleveland 6. 272 p., \$5.00.

* * *

"Manufacturing Processes," by M. L. Begeman. The most recent advances in manufacturing methods have been incorporated in the text of the second edition of this book on shop processes. Technical fundamentals of engineering processes and methods have been stressed and thorough discussions of modern improvements included. Chapters contain information on foundry practice including special casting methods, plastic molding, heat treatment, powder metallurgy, hot and cold forming, welding, machine tools, and other subjects. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 626 p., \$5.00.

* * *

"ASTM Specifications for Steel Piping Materials." December 1946 compilation includes requirements of materials such as castings, forgings, bolting materials and nuts used in piping installations as well as specifications for steel piping materials. Standards are given for valve, flange and fitting castings and also for carbon and alloy steel bolting. Specifications for forgings and welded fittings are included. Section E19-46 concerns austenite grain size in steels. American Society for Testing Materials, 1916 Race St., Philadelphia 3. 307 p., \$3.00.



Western Metal Congress

First postwar meeting on West Coast attracts top authorities in metalworking field . . . Exhibits reflect Hollywood influence . . . Papers cover metallurgy, welding, foundry practice, hardness testing and light metals.

BOTH in exhibits and in technical papers, the fifth Western Metal Congress and Exposition, held March 22 to 27 at Oakland, Calif., proved a high quality replica, on a smaller scale, of the annual National Metal Shows.

Officers and trustees of the sponsoring American Society for Metals and the participating American Welding Society and American Foundrymen's Association registered almost full attendance. The speakers list contained mostly top-flight authorities from the East and Midwest eager to absorb sunshine while shedding intellectual light. Many of the papers presented were in the nature of educational lectures or reviews, correlating developments in the various technical fields since the last Western show was held at Los Angeles in 1941. Most speakers discussed at least one or two facets of their subjects which had not been presented previously at technical meetings, however.

In addition to the three societies sponsoring programs, cooperating societies included the American Chemical Society, American Industrial Radium & X-Ray Society, American Institute of Electrical Engineers, American Institute of Mining & Metallurgical

Engineers, American Petroleum Institute, American Society of Civil Engineers, American Society of Mechanical Engineers, American Society for Testing Materials, American Society of Tool Engineers, Mining Assn. of California, Northwest Electric Light & Power Assn., Pacific Coast Electrical Assn., Pacific Coast Gas Assn., Purchasing Agents' Assn. of California, Society of Automotive Engineers, and Western Oil & Gas Assn. No Congress banquet was held, although delegates and guests attended an official Congress dinner dance in San Francisco.

An American Welding Society official convention luncheon marked the 25th anniversary of the San Francisco section. Lee Delhi, Hunt Mirk & Co., national president, was the principal speaker. The society's Lincoln gold medal was awarded to H. E. Kennedy, Albany, Calif. American Foundrymen's Association events also included a luncheon.

Exhibits were displayed both in the main Oakland Civic Auditorium and in the adjoining Armory. Operating exhibits predominated. Although the Exposition lacked the huge elaborate exhibits of the National Metal Show, greater evidence on showmanship possibly

influenced by Hollywood, was noticeable. What the exhibits lacked in educational movies was made up for by industrial firms featuring sideshow barker, shooting galleries, glamor girls, contests of all sorts, and a high concentration of souvenirs. Attendance at the exhibits exceeded expectations on all days, although many of the papers drew only small audiences. Principal points covered by some of the outstanding papers follow.

Creep and Stress Rupture Data Interpreted

Emphasis on design considerations in the use of alloys for high temperature service was presented by Francis B. Foley, superintendent of research, Midvale Co., in two lectures on "Interpretation of Creep and Stress Rupture Data." In order to attain highest high temperature strength, he recommended avoiding conditions promoting rapid grain growth and avoiding using a metal in a range of temperature where it undergoes transformation. This infers imposing a grain size which is not likely to grow at the temperature of service and generally following the practice of providing a structure as stable at the service temperature as is possible prior to putting the metal into service.

After reviewing the development of creep testing, he pointed out that creep curves run for the purpose of determining rate of deformation tell nothing about the time it will take for a metal to fracture under the loads applied. This gave rise to tests determining stress vs. time-to-fracture, or the stress-rupture curve. Data presented provided a warning against using an arbitrary method of deriving design stresses from the limiting creep stress. Mr. Foley summarized that rapid deformation produced by overloading causes greater ultimate flow than does slowed deformation resulting from low loads. He challenged the belief expressed by some that failure of chrome-nickel alloys in service seldom is a result of creep.

He contrasted the phenomenon of cold working in metals stressed at room temperature with that of creep at high temperatures. Generally speaking, it was stated, the effects of cold working decrease with increase in temperature and the temperature limits with respect to cold working effects are dependent on the composition of the metal.

Under conditions of cyclical loading, cooling, and reheating, such as occur in jet engines or turbosuperchargers, the permanent deformation characteristic of the first stage is experienced in each re-heating and re-loading, resulting in permanent increase in the length of the specimen at each cycle. This contrasts with steady creep test conditions, in that under constant load-temperature conditions the first stage of creep is experienced but once and is succeeded

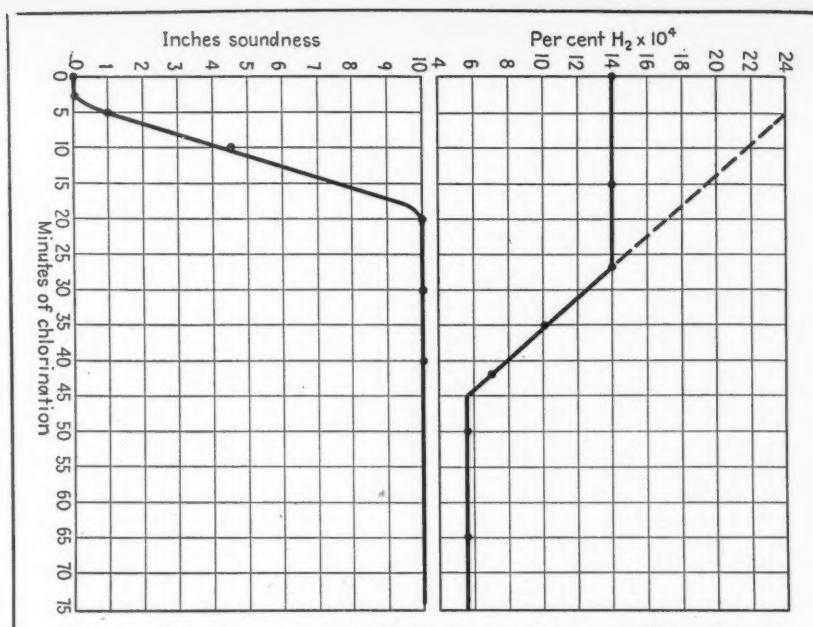
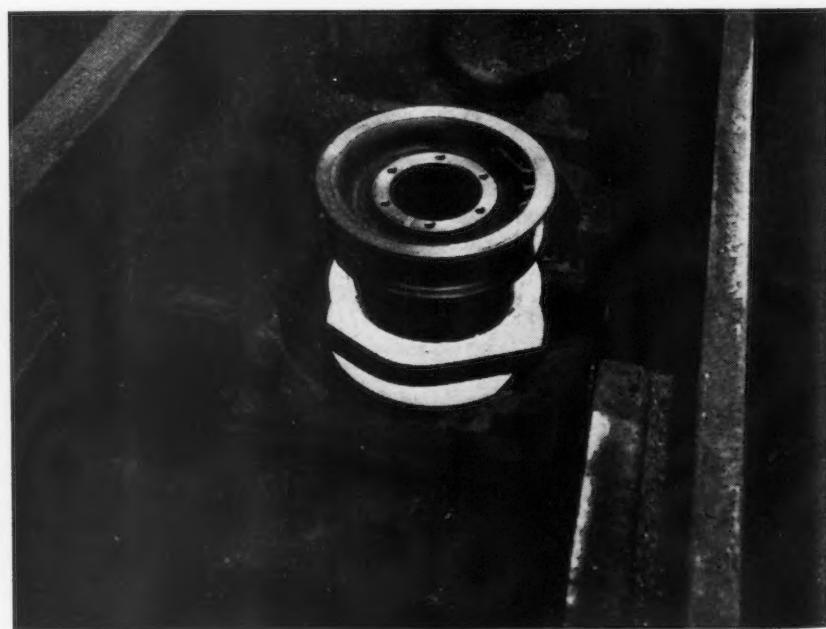


FIG. 1—Effect of Cl_2 on amount of hydrogen remaining in a mold together with its effect on the amount of porosity in a test magnesium casting.

by a steady but decreasing rate of flow.

Failure by fracture is inevitable eventually in creep testing at high temperatures, no matter how low the load, extrapolation of the stress-rupture data on log-log coordinates indicates. Evidence by Hanson and Wheeler was cited to show that as stress decreases the deformation of the structure is largely confined to the grain boundaries as though the low stress were in excess of the intercrystalline cohesive strength of the metal but below that of the crystal planes within the grains. Thus, failure appears selective. A load representing the intercrystalline strength of a material might be borne indefinitely, further examination suggests, however. This would be the load obtained by extrapolation to zero elongation of the load to rupture-elongation plottings.

FIG. 2—Induction hardening a track roller rim.



Development of residual stresses of the proper orientation and magnitude will greatly increase the strength of structural materials and is an important metallurgical and design factor, J. O. Almen, head, mechanical engineering department, General Motors Research Laboratories, declared.

Pointing up his discussion of "Effect of Residual Stresses on the Fatigue Strength of Metals," Mr. Almen called attention to the lack of data as to what happens to materials in the zone between static testing, with the load applied once, and fatigue testing, with the load applied many times.

Because most machine elements have a compression load, tensile tests are misleading as to the fatigue strength of materials used in such parts, it was indicated. Fatigue strength of materials may exceed static strength, he pointed out.

Strength of carburized parts, often attributed to microstructure, is principally due to creation of residual compression stresses at both surfaces, where the load occurs, with tension stresses in the interior. Destructive testing bearing out this assertion was cited.

He criticized promiscuous use of stress-relieving treatments following the theory that all residual stresses are harmful. In the process of stress relieving, the strength of a large percentage of heat treated parts actually is reduced, he declared. Control of residual stresses as to direction, magnitude, and depth, and taking into account the character of loads that are to be applied in service use is necessary for proper design.

Illustrating harmful practice resulting in reduced fatigue life, he cited the case of a polished aircraft engine rocker arm. The polishing destroyed the compression stresses on the surface, thereby hastening failure.

Several examples were given of introduction of compressive stress by shot peening. Among these were springs which were shot-peened before pre-setting. Full consideration of the direction from which the load is applied is most important, it was indicated, so that the part will not be in tension at that point.

Golden Gate Lecturer Discusses Hardenability

Benefits and limitations of specifying by hardenability bands steel of the 12 types now available on that basis were outlined by A. L. Boegehold, head, metallurgical department, research department, General Motors Corp., in the Golden Gate Lecture.

Development of hardenability bands was reviewed, benefits were cited of control of hardness of parts in the as-quenched condition over a large number of heats of steel, resulting in less variation in residual stresses resulting from quenching, reducing distortion and cracking, and increased durability. A sample hardenability band was compared with the range of hardenability that can be expected when steel is ordered to chemistry limits. The interpretation of hardenability bands in terms of hardnesses that can be obtained in various section sizes was discussed with evidence presented to show that reasonably accurate predictions of hardness in various section sizes can be made from hardenability curves.

When parts are to be hardened only at the surface there is little advantage in use of hardenability bands, Mr. Boegehold stated. When center hardness limits are specified, the bands present greater utility. At present, the bands are not sufficiently restrictive for purchasing steel for highly stressed parts where a



H. E. KENNEDY, coinventor of the Union-Melt welding process is awarded the AWS Lincoln gold medal from Lee W. Delhi, president of the welding society. The presentation was made at a luncheon during the Western Metal Show.

narrow range of hardenability is required.

Tests were carried out, the speaker stated, to determine the influence of severity of quench caused by varying the velocity of the quenching medium and its effect on hardness predicted in quenched sections. It was indicated that speeding up the quenching medium, water, gave little effect on derived hardness at the center, although the hardenability of the steel influenced the results.

Need for specifying maximum limits of hardenability was expressed.

Narrower Hardenability Bands Held Desirable

Present limitations on use of hardenability bands in specifying steel, due to insufficient accuracy, could be aided by bringing up the lower limits, Walter E. Jominy, staff engineer, Chrysler Corp., declared in response to an audience question following his paper on "Hardenability of Steels."

Mr. Jominy traced the development of measuring and calculating hardenability. He pointed out that calculation is only an approximation, and described it as fairly accurate for manganese steels such as the SAE 1300 series, somewhat less accurate for the chromium steels and double alloy steels and least accurate for the triple alloy steels.

In practical application of hardenability data, he called attention to Boegehold's method for the determination of the cooling rate at various places in a part. By this method it is possible to predict with accuracy whether heats of steel will harden properly in production operations at the time these heats are received and before fabrication. With such data a proper purchasing specification based on hardenability may be written. It is not always possible to purchase steel to the indicated requirements and it is usually much easier to purchase to minimum hardenability requirements if conditions permit.

It was also demonstrated that in some cases maximum hardenability also is a factor of importance.

Rolling on magnesium sheet on large continuous mills and of magnesium shapes on presently existing

(CONTINUED ON PAGE 170)

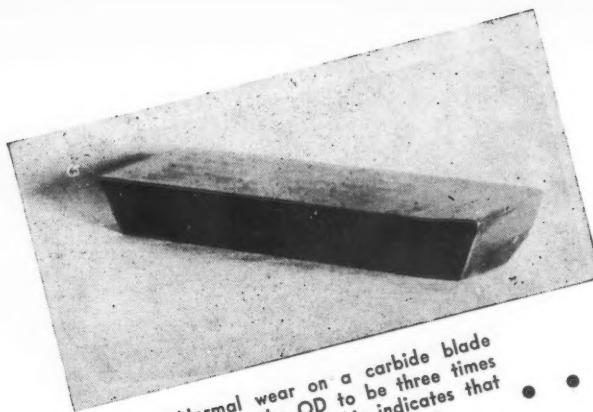


FIG. 48—Normal wear on a carbide blade showing wear on the OD to be three times that on the cutting face. This indicates that all cutting conditions are correct.

COMMON shop practice is to refer to cutter life as "life between grinds," and after a little consideration it is clear that this method of measuring the life of carbide tools (cutter blades in milling) goes directly to the heart of the problem of carbide life. Production men are interested solely in the length of time a cutter will stay on the job, for this determines cutter reconditioning costs and, above all, the downtime on the machine. This latter is an extremely important and even critical factor, particularly in production runs.

While it is true that up to a certain point the depth of cut will not appreciably influence blade life, the volume of metal removed may nevertheless be a helpful manner of determining not only cutter life but other interesting phases of carbide operation. Usually, however, the determination of life by noting the square inches covered rather than the cubic inches removed is a more accurate yardstick.

As just stated this is true up to a certain point. When the depth of cut is increased to the point where vibrations are set up in the workpiece and the machine, and therefore the cutter, then the life between grinds will rapidly deteriorate. In other words, while

Previous articles in this series covering carbide milling were as follows:

Part No.	Subject	Issue Date
1	Fundamentals of Carbide Milling	Feb. 13, 1947
2	Low Carbon Steel and Wrought Iron	Feb. 20, 1947
3	Straight Carbon and Cast Steel	Feb. 27, 1947
4	Heat-Treated Steels	Mar. 6, 1947
5	Armor Plate, Heat-Treated Alloy Steel, Stress-proof Steel, Die Plates	Mar. 13, 1947
6	Stainless Steels	Mar. 20, 1947
7	Semisteel, Alloy Cast Iron, Ni-Resist	Mar. 27, 1947

it is usually possible to mill the same number of square inches from a given workpiece at 0.300 in. depth as at 0.100 in. depths, when the depth is increased to the point where vibrations are set up, then life in terms of square inches rapidly deteriorates. But it is true that up to that point, the square inches removed will remain the same regardless of the depth of cut. Therefore, within these same limitations the same number of pieces in a production run will be milled regardless of the depth. It is, therefore, advisable to use the square inch yardstick for life determination for all reasonable depths of cut.

The use of the square inch yardstick will, if intel-

How to Use Carbide

By H. A. FROMMELT
Consulting Engineer, Chicago

ligently used and interpreted, yield interesting information. Thus it will become immediately evident that the square inches of material that can be removed from a component having cored areas that result in an interrupted cut, will be considerably reduced as compared with the square inches it is possible to remove from components composed of the same material but with plain uninterrupted surfaces.

Other yardsticks such as the volume of metal in pounds, or the equivalent length of an unbroken chip, may be valuable in tests and comparative determinations, but have little or no practical use for actual shop conditions. Thus it is interesting to compare the life of a carbide tool used single-point fashion, as in turning or boring, with the life of blades used in a milling cutter working on the same material and as far as possible under the same conditions. It is significant that in single point tool work such as on a lathe the total length of chip removed is far greater than the total length of chip removed in milling, ideal conditions prevailing in both applications.

Hence the commonly used yardstick for life between grinds in terms of the number of pieces milled, is not only a practical shop yardstick, but it is, if properly applied and interpreted, correct.

One precaution however must be carefully observed. Life between grinds should be per blade and not per cutter. Two cutters with different numbers of blades, though otherwise of the same design, will obviously yield different life results although used under identical conditions. Thus an 8-in. cutter with eight blades will remove 25 pct less than an 8-in. cutter with ten blades, provided, of course, that both cutters are used under identical conditions. Since there is more carbide in terms of blades to remove the metal, each blade removes less metal, and should show less wear after milling the same number of pieces or square inches than a cutter with fewer blades.

From the standpoint of the cutter reconditioning problem, life between grinds per blade rather than per cutter becomes the proper application of this yardstick. Cutter reconditioning costs depend largely upon the number of blades being ground. With 25 pct fewer blades, the reconditioning cost will be proportionately less.

Carbide Versus High Speed Steel

The use of carbide being in the initial and introductory stages in American industry, comparisons between carbide and high speed steel life are inevitable.

Cutters for Milling

... Factors Governing Cutter Life

... Selecting Feed Rates

The various factors which govern the life of a carbide cutter are explained in this eighth article of the carbide milling series. Actual wear on the various edges and the causes of this are considered, as well as chipping and breakage. The selection of the various grades of carbide for different jobs is considered together with optimum feed rates, and a method of selecting feed rates to suit varying conditions is discussed herein.

It is justifiable to expect greatly increased life with carbide over high speed tools, since carbides are many points harder. The relative hardness of the cutting materials is one of the important factors in cutter effectiveness, and life of the cutting material. The greater the difference in hardness between the cutting material and the workpiece the greater the effectiveness and tool life. Many other factors enter into the final determination of cutting effectiveness, but one of the basic, and perhaps the first reason for carbide's greatly increased cutting efficiency, is its relatively greater hardness.

Since the cemented materials such as the tungsten and tungsten titanium carbides are characterized by hardness, they are also more brittle, and have a greater tendency to chip when subjected to vibrations or sudden blows. Thus, in order to capitalize on this characteristic of great hardness, it becomes necessary to operate these cutting tools properly in rigid setups with the workpiece properly held and the machine free from backlash, play, and maladjustment.

For practical reasons, particularly for larger job lots, and especially in production runs, it is essential that cutter life with carbide be considerably greater, in fact many times greater, than with high speed steel. It does not suffice that carbide operations be just as good as with high speed, or even somewhat better. Carbide life in machining must be much better than high speed steel operations.

The reason for this is plain from the following considerations. Surface foot rates for carbide vary from three to ten times those for high speed steel when milling the ferrous materials. The feed rates too are increased proportionately. Generally speaking, from two to five times as many of the same pieces will be produced with carbide in a given unit of time as with high speed steel. Hence, unless the life of the carbide tool is likewise many times greater than that of high speed steel, the downtime on the machine in a given production period will be increased to the point of irritation, and even dissatisfaction.

At this point it is pertinent to consider the evidences of tool wear which indicate that a cutter blade or a

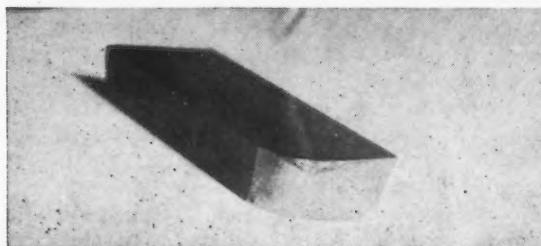
single point tool has reached the point where grinding and reconditioning are necessary.

It is part of the duty of the metal removal technician to make sure that tool wear is normal. Thus, in milling, the wear on the OD of the carbide blade should normally be three times that of the wear on the cutting face. The nature of milling, in which the workpiece is fed into the cutter, demands this relationship. This is clearly indicated in fig. 48 where the effects of normal wear are clearly visible. The OD of the blade shows three times as much wear as the cutting face. This is as it should be in normal carbide milling operation.

Fig. 9 (Part 2, Feb. 20, 1947) shows what is referred to as build-up. If a cutter is not properly operated as regards feeds and speeds, the material, particularly cast iron, will cling to the cutting edge. Build-up can generally be minimized, if not entirely eliminated, by increasing the spindle speed or the surface foot rate.

Another and more aggravated form of build-up is shown in fig. 10 (Part 2, Feb. 20, 1947). Here the chip actually clings to the cutting edge. This condition is frequently encountered in the milling of certain kinds of steel. The softer materials, including wrought iron and some of the stainless steels, have a low machinability rate for this reason. Chips of these materials have a tendency to cling to the blade, and thus greatly add to the friction and abrasion, if not

FIG. 49—Excessive wear on the OD caused by too light a chip load, too small a feed rate, or too high a spindle speed.



cutting pressure, to which the blade is subjected. Here again the remedy is generally an increase in the spindle speed.

Fig. 49 indicates excessive wear on the OD of the carbide blade. This is frequently due to too light a chip load, too small a feed rate, or too high a spindle speed. All of these are related, and changing the one alters the other. Thus, if the chip load is increased, it increases the feed rate. If the surface foot rate is too high, the chip load is increased provided the feed rate is left unchanged.

Fig. 50 shows wear on the OD of the blade due to excessive vibrations or chatter, either in the machine itself or in the workpiece. This will cause the carbide blade to chip as shown. Obviously the remedy here is machine adjustment, a new machine or a better method of holding.

Uneven or unequal wear is shown in fig. 51. As previously noted, the wear on the OD should be three times that on the face. Here, the wear on the cutting

power available in the milling machine, it becomes necessary to carefully adjust the rate of metal removal to the power available. If this is not done, and the machine is overloaded, it may stall. Usually, this results in broken or badly chipped blades.

An alert operator can prevent damage to the blades if, noticing the action of an overloaded machine, he disengages the feed, leaving the spindle to run and thus permitting the cutter to free itself. Some milling machines are now provided with overload relays on the table feed motor, rather than the spindle motor. This is possible, however, only on the larger equipment where separate motors drive spindle and table.

The factors affecting tool life may be discussed under the following heads: (1) Cutting materials, (2) the cutter, (3) the workpiece, (4) the machine. Each of these divisions will be discussed in detail in the order listed.

Selection of Cutting Material

The proper selection of the cutting material, that is, the proper grade of carbide, is the first essential step to obtain good cutter life. Otherwise, it is possible to set up a dramatic operation as regards feeds and speeds and which to all appearances is entirely satisfactory. But on the production line where down time on the machine and lost machine hours are important, it is necessary to subdue dramatics in favor of good overall results, not only as regards decreased cutting time, but also total overall time lost on each job.

Reputable carbide manufacturers make available various grades of carbide suited to job classifications, particularly as regards hardness of the workpiece and its abrasive character. It is important that the recommendations issued by the carbide manufacturer be followed carefully and specifically in selecting a grade of carbide that will give maximum cutter life for each particular job classification.

Selecting the proper cutter for the job is the next important step to keep the tool working for an optimum time between grinds. Face milling, which is one of the more common milling operations, should be performed with a cutter whose diameter has the proper relationship to the workpiece face width. For example, if a 5-in. wide workpiece is being milled, an 8-in. diam cutter should be selected. Therefore, the ratio of 8 to 5, approximately, is properly applied in the selection of a cutter for the job. This ratio is obviously approximate, and may in practice be 3 to 2 or 10 to 7.

Moreover, the cutter should be properly placed with respect to the workpiece. It should be set on the bias, which means that the centerline of the cutter should be higher than the centerline of the workpiece face. In other words, the teeth should enter the workpiece at an angle as close to 90° as possible.

This also assumes that the job will be performed by the climb rather than the conventional method. That is, the travel of the teeth in the face mill will be in the same general direction as the travel of the workpiece, rather than against it. In a climb milling cut, the thickness of the chip at the beginning of the cut is appreciable, if not at a maximum. Whereas, in the conventional method, the chip is thinnest at the beginning of the cut. This latter technique makes for increased friction and abrasion, whereas the former or climb method gives the carbide blade a good bite, which is always preferred from the standpoint of the least wear and damage.

Where machines are not suited for climb milling,

TABLE VI

Feeds for Milling Steel with a 20 hp Mill

Feed rates shown in this chart are based on 20 hp consumption

Width of Cut, in. in. in.	Recommended Cutter Diam., in.	Depth of Cut, in.						
		0.050	0.100	0.150	0.200	0.250	0.300	0.350
		Feed Rate ipm						
1	2	60*	60*	60*	60*	60	53	43
2	4	60*	60*	50	37½	33	25	21½
3	5	60*	50	33½	25	20	16½	14½
4	6	60*	37½	25	18½	15	12½	10½
5	8	60	30	20	15	12	10	8½
6	10	50	25	16½	12	10	8½	7
8	14	37½	18½	12½	9½	7½	6½	5½
10	18	30	15	10	7½	6	5	4½
12	20	25	12½	8½	6½	5	4	3½

* Highest available feed rate on standard machines. If feed rate shown on chart is not available on machine feed control, use next lower feed control reading.

Courtesy Kennametal, Inc.

face of the blade is the same approximately as that on the OD. This indicates that the face clearance angle is ground incorrectly, and therefore too small. Face clearance angles are critical factors in life determination and should be carefully observed as to their effect on blade wear.

Chipped and Broken Blades

Aggravated chipping or actual breaking of blades sometimes occurs, and may result either from an accident or stalling of the milling machine. If the workpiece is accidentally run into a standing cutter, as when using the rapid traverse to position the component with respect to the cutter, a blade or blades will be broken. The remedy for this is the remedy for prevention of accidents, namely, care and caution on the part of the operator.

Stalling a cutter in the cut is, unfortunately, frequently possible with carbide, unless the proper feed rates are selected. Until the advent of carbide, machine tool capacities in terms of motor size on a spindle were of little or no importance. Limitations in machining resided largely, if not entirely, in the cutting material. The top rate for metal removal with carbide, however, has not as yet been determined. At the moment, therefore, with decided limitations in the

that is, where they are not equipped with a backlash eliminator or climb nut adjustor, the conventional method must be used. But if climb milling is adopted, the adjustment of the table screw in the table nut should be made and kept at all times. It is essential in climb milling that there be a minimum of backlash between the table screw and the table nut, lest the workpiece be pulled into the cutter in an amount equal to this backlash or play. If this is excessive, damage will, of course, result to the cutting tools.

Cutter design will influence cutter life. It is pref-

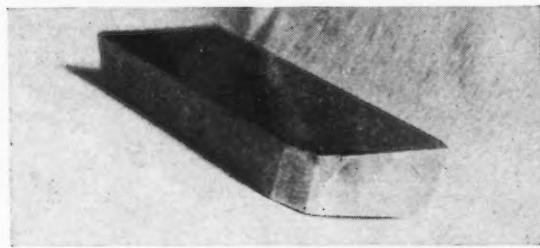


FIG. 50—Chipping of the OD is usually caused by excessive vibration in either the workpiece or the machine itself. The remedy for this is machine adjustment, a new machine, or a better method of holding.

erable that the blades be set radially rather than axially. A solid carbide blade is preferred, at least for the heavier cuts, rather than a brazed tip cutter.

These and other points in cutter design and their influence upon the operating characteristics of a milling job are reserved for detailed discussion elsewhere in this series.

The selection of the proper speeds and feeds is an important factor in good cutter life. Recommended spindle speeds based upon the Brinell hardness were shown in table III (Part 3, Feb. 27, 1947). The spindle speeds are given directly for various cutter diameters depending upon the Brinell hardness number of the workpiece. These Brinell hardness numbers range from 160 to 420, thus covering the usual range of hardnesses encountered. While the use of this table demands judgment based upon experience, it does serve as the starting point in the problem of selecting the proper spindle speeds. Variations from the table will be made, based upon the condition of the machine and also on unusual physical and metallurgical characteristics in the material. These variations in the spindle speed required for successful milling have already been discussed at length.

Selection of the proper feed rates presents a slightly different problem. Table VI makes it possible to select the proper feed rate having a 20 hp motor available in the milling machine and knowing the width and depth of cut.

Selecting the proper feed rate depends primarily on two factors, the nature of the workpiece, its rigidity and the size of its cross section, and secondly on the amount of power available.

An example will help to make the approach to the selection of the proper feed rate a simple step. After an examination of the workpiece, it is determined, by experience, that metal can be removed at the rate of 50 cu in. per min without undue vibration and giving a suitable finish. If the width of cut to be taken is 4 in. and the depth is 0.250 in., the cross-sectional area of the cut will be 1 sq in. Thus, if 50 cu in. can be removed per minute, the feed rate can be 50 ipm.

Since the K-factor on steel is on the average 1 hp per cu in. per min, then it is clear that 50 hp will be required for this operation. If a milling machine this size is not available but a 25 hp can be used, then the feed rate must be reduced to 25 ipm.

It is well to make one additional check. If an 8 in. cutter with eight blades is being used for this operation, it will be well to determine the chip load or the feed per tooth at 25 ipm. If the rpm selected for the job is 250 (a surface foot rate of approximately 500), then the chip load will be 25 divided by 8 and this in turn divided by 250. This results in a chip load of approximately 0.012 in. Since this is a normal chip load for carbide, the milling job can now be undertaken.

It is well to note that if the 50 ipm feed rate has been selected, provided 50 hp had been available, the chip load would then have been doubled, resulting in a feed per tooth of 0.024 in. approximately. This is not only a satisfactory tooth load, but will result in better cutter life, provided sufficient rigidity in the setup is possible.

Table VI makes it possible to select the proper feed rate for a 20 hp machine. Tables for other horsepowers, from 5 to 50 are available. However, it requires but a simple calculation to determine the feed rate for the horsepower available, using this chart. Thus, if only a 10 hp machine is available, the feed

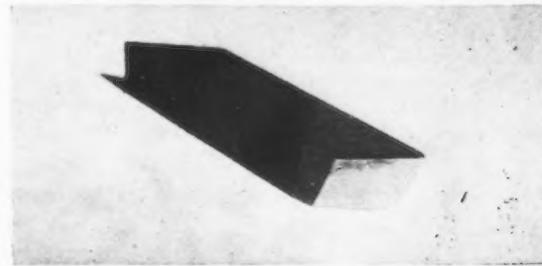


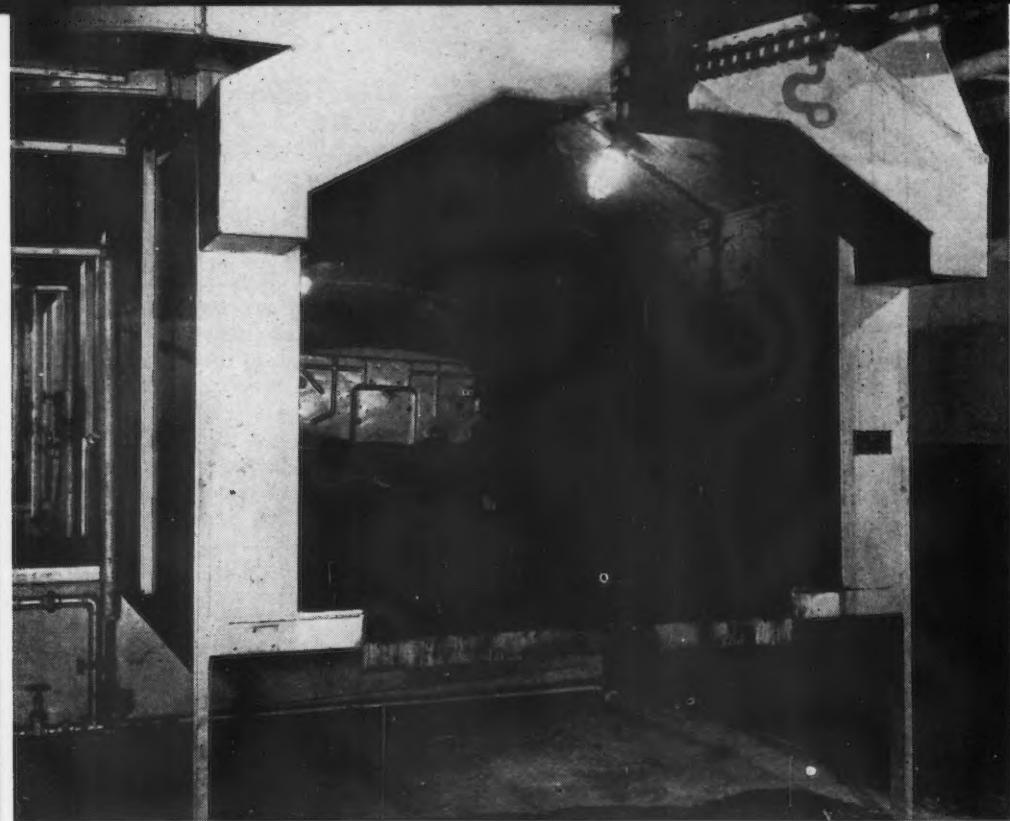
FIG. 51—Wear on the cutting face approximately equal to that on the OD indicates that the face clearance angle is incorrectly ground.

rate will be halved. If a 5 hp machine is available, the feed rate shown in table VI will be divided by four.

Due consideration must be given to the nature of the workpiece in setting up a milling operation for optimum cutter life. The prime consideration is the sturdiness of the component, that is, the size of its cross-sectional areas, the possibility of holding the workpiece rigidly, and its general characteristics as regards rigidity. Experience alone dictates the rate at which metal can be removed from a given workpiece without setting up vibration, thus limiting cutter life and also resulting in unacceptable finishes.

Thin sections in a workpiece, unsupported, necessarily reduce the rate at which metal can be removed. Thin unsupported sections may necessitate reducing the number of cubic inches that can be removed per minute to as little as five. On the other end of the scale, however, solid, rigid chunks of workpieces can be subjected to metal removal rates as high as 100 to 150 cu in., provided only that the power is available in the machine. The point to be remembered here is this: The limitations in machining no longer reside in the cutting material but only in the workpiece (its tendency to vibrate) and in the size of the motor attached to the spindle and the table.

Part 9 of this series on carbide milling will appear in the next issue.—Ed.



... New

• • •
By HERBERT CHASE
• • •

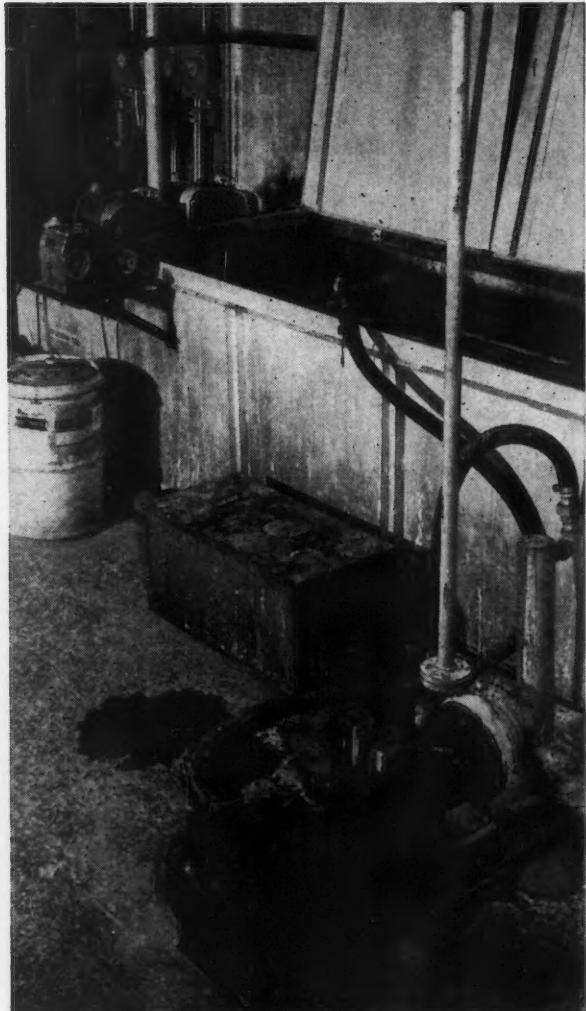
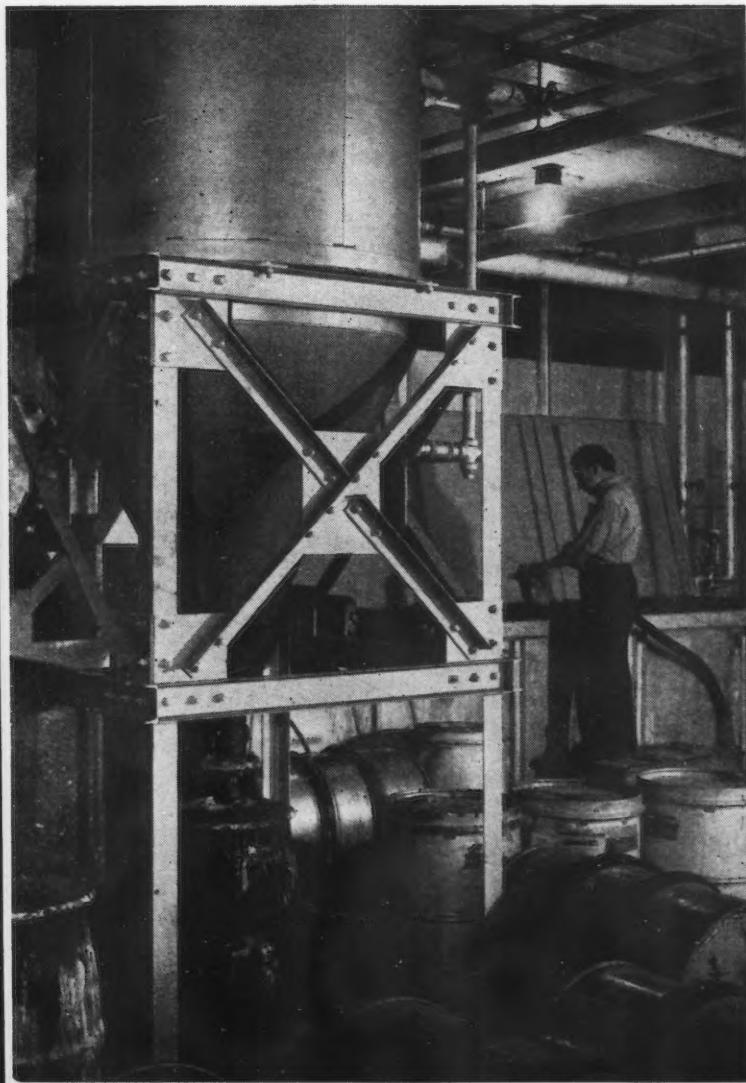
FIG. 1—Discharge end of a phosphate treatment tunnel. The body is shown emerging from the final spray zone.

BELOW

FIG. 2—A section of a phosphate treatment tank which extends under the tunnels and catches solution that drains from the car bodies. The pump in the foreground is used to suck sludge from the bottom of the tank. Proportioning pumps can be seen mounted on the end of the tank.

BELOW

FIG. 3—Conical-bottom settling tank for sludge which is being drawn from the phosphate tank by the operator in the background.



Phosphating Tunnels Installed at Ford

ALTHOUGH the Ford Motor Co. has long used some form of phosphate treatment, including dipping, for many sheet steel parts in the manufacture of Ford and Mercury cars, the practice has recently been extended to include complete bodies of both makes. This has involved the installation of two new tunnels, each equipped for the latest type of spray treatment. This treatment is done on a continuous basis as the bodies are advanced by the same overhead chain that brings them from body assembly lines and subsequently carries the bodies through painting operations, as shown in fig. 1. On the Ford line, bodies are treated at the rate of one a minute although passage through the tunnel requires more than this time. For Mercury bodies, about 30 an hour are processed.

Before reaching the processing tunnels, the sheet metal work on the bodies is completed and the body shells, including doors, are completely assembled. All surfaces that require filing, grinding or other operations necessary to present satisfactory smoothness are so treated and are wiped relatively clean. This makes it unnecessary to disturb the treated surface after bodies issue from the phosphating tunnels.

Although the body shell is fully assembled, glass is not in place and trunk compartment doors are left open. Hence, all surfaces, both interior and exterior, are subjected to the jets of spray that issue from all sides and directions so that no surface escapes the chemical actions they are intended to receive. Each tunnel is continuous but, in effect, is divided into five zones for each of the five treatments required. These,

Application of phosphate coatings on an assembly line basis in two spray tunnels recently installed by Ford Motor Co. is described in this article. Data are given on the processing steps, method of handling solution and sludge and pumping equipment.

in order, are: (1) Cleaning, (2) water rinsing, (3) phosphate treatment, (4) water rinsing, (5) dilute acid rinse.

Under each of the three chemical treatment areas there is a tank into which the liquid used drains. Provisions are made, of course, for replenishing the solutions and keeping them at proper concentration as well as for removing foreign matter and sludge, as is explained later. Tunnel walls are of sheet steel and, in the phosphate treatment area, are of stainless steel which resists the chemical reaction of the solution used. The chain carrying the bodies runs through a channel with only the supporting hooks exposed and hence is not subjected to the spray.

All spray nozzles clear the bodies, of course, and are fed from loops of pipe spaced at frequent intervals near tunnel walls, roof and floor, the sprays being so directed that every body surface receives its quota of liquid as it passes through each zone.

In the first zone the spray nozzles are fed under a pressure of 25 psi, yielding a jet of high velocity which aids in the cleaning action. The cleaner has an

FIG. 4 — Following the phosphate treatment, the auto bodies are dried by passing between banks of infrared lamps. Solution which might remain in crevices is blown out with air.



emulsified mineral oil base to which is added sodium-metasilicate. This solution is heated by steam to a temperature of 150° to 155°F in a tank below the tunnel and is fed by pump in V-shape jets. Most foreign material washed off floats to the surface of the tank and is removed, any heavy solid particles being caught on screens. Duplicate centrifugal pumps, used alternately, circulate the cleaner and it is kept at proper concentration by additions of the ingredients required as indicated by hourly analysis.

Cleaning action continues for about 1 min. after which the body enters a rinse zone in which water at 130° to 140°F is sprayed on. This removes all traces of cleaner before the body reaches the zone where the phosphate treatment is applied. It is done in a fine mist-like spray of a standard solution supplied by two different makers and includes acid phosphate, plus an accelerator.

Phosphate treatment requires about 60 sec, the solution being at 120° to 130°F. A slightly etched surface on the sheet steel of the body results. The coating formed, besides being an integral part of the metal surface and a good rust inhibitor, provides a bite for the primer which is applied subsequently.

All the phosphate solution that drains from the body returns to a tank which extends under the treating zone and, after being filtered through screens, where a scum collects and is skimmed off, is recirculated by one of two centrifugal pumps provided for this purpose. Replenisher solution is fed in automatically by one proportioning pump while another adds the required amount of accelerator.

Some sludge, chiefly inert ferric phosphate, forms in the phosphate treating tank, which is of stainless steel construction, and is removed by a suction nozzle (fig. 2) and deposited in a separate conical-bottom settling tank (fig. 3) where solution can be drawn off and reused and the sludge collected for disposal.

From the phosphate treating zone the bodies are advanced through the fourth zone where they are spray rinsed with cold water from the supply main. This substantially stops the reaction of the phosphate solution and leaves the bodies ready for the final treatment in the tunnel.

In the fifth zone, the bodies are sprayed with a dilute solution of chromic and phosphoric acid added in equal parts in the ratio of 6 oz of the mixture to each 100 gal of water. This solution is steam heated to 130°F and is used as a precaution against carrying forward any acid salts from the phosphate treatment tank. Should any such salts remain, they might result in a continuing reaction and cause blistering of the enamel applied subsequently.

As this final treatment in the tunnel leaves the bodies hot, they tend to dry quickly upon emerging from the tunnel but, to insure more rapid and thorough drying, the bodies are conveyed after leaving the tunnel between banks of infrared lamps, fig. 4, where drying is substantially or fully completed. If any liquid remains in crevices, it is blown out with air after the infrared heating. This leaves the bodies ready for painting.

Some indication as to the effectiveness of the phosphate treatment is obtained from reports of the Ford Laboratory on salt spray treatment. On identically painted steel panels, those not given a phosphate treatment showed progressive rusting and lifting of the paint film after an average of 500 hr of exposure. Panels that are given the phosphate treatment do not show similar effects until exposed an average of about 2000 hr. These are, of course, accelerated tests, but observation of cars under average service conditions indicates that phosphate treated bodies yield far longer service without signs of rusting than those not so treated. Such tests are considered as fully warranting the extra cost of the phosphate treatment.

Radial Head Positioner Speeds Welding Operations

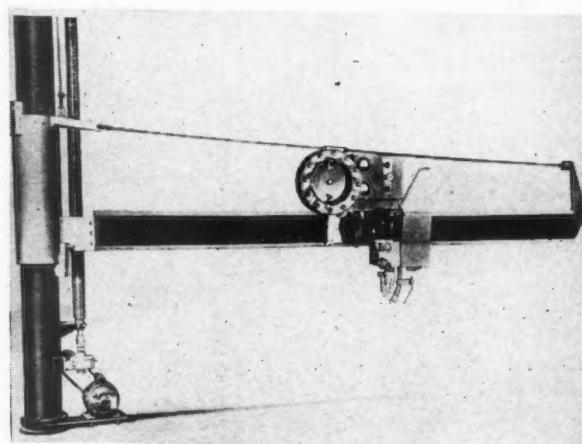
GREATER mobility and a decreased time lost for users of the automatic shielded metallic-arc welding is made possible by a new type of fixture, shown in the accompanying illustration, which is composed of an automatic shielded-arc welding head, traveling on a beam that encompasses a vertical zone of 8-ft, with the assembly rotating around a fixed axis to a maximum radius of 20 ft. It is designed to augment the efficiency of automatic arcwelding, and is manufactured in three standard sizes, providing a 10, 15 and 20-ft horizontal arc travel.

The traveling assembly is a Lincolnweld head and the carriage is capable of traveling the full length of the beam, while the vertical operation of the head, powered by a motor-driven adjustment on the beam, covers an operating zone from the floor upwards to a height of 8 ft.

The vertical adjustment of the beam is accomplished at a rate of 36 ipm and permits inching the beam up or down to obtain the exact height for any particular welding operation. The beam, in its horizontal applications, may be swung manually 360° about its axis.

Known as the Arc Positioner, the device is manufactured by Mark F. Gouran, welding engineer, 7426 Devon St., Mount Airy, Philadelphia, and its develop-

ment came about when a study of time-loss factors revealed that too many shutdowns and operation lags were being encountered due to faulty materials handling. The automatic shield-arc welding process provides welding speeds many times greater than manual methods, yet the great speed of this process was frequently wasted by improper handling of jobs to and from the welding line.



New Equipment...

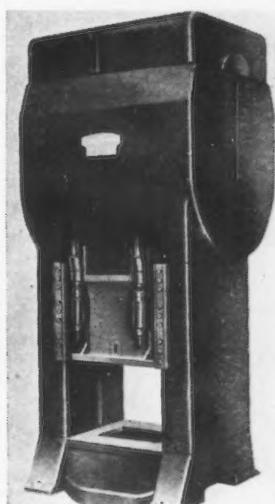
New developments in plastics injection presses, chucking, milling, boring and grinding machines, heat treating units, deburring barrels, a metal reclaiming mill, combustion and permeability testers, and skid boxes and platforms are among the equipment described in this week's review. Micrometers, quick-acting clamps, and welding electrodes are also discussed.

Plastics Injection Press

1 Vertical construction, incorporating the use of a single hydraulic cylinder, characterizes a new vertical plastics injection press manufactured by the *Giddings & Lewis Machine Tool Co.* This design has been developed to provide for clamping the mold halves together and injecting the plastic material into the mold cavity in a single stroke of the piston rod. When the cylinder is activated, the piston rod movement operates a toggle mechanism which locks the die plates together. As the piston rod continues its downward movement, it serves as plunger to inject thermoplastic material into the mold. Cycle time is said to be reduced and elaborate holding devices are eliminated in insert molding operations. This vertical machine design is said also to provide simpli-

self-contained unit with no moving parts and is manufactured by the *Castaloy Corp.* A Dowtherm E heat transfer medium sealed in a welded vacuum chamber vaporizes when efficient operating range is reached, transferring heat to the operation through flexible tubes or pipes. It is stated that at an operating temperature of 400°F, pressure is 15 psi which assures trouble free operation. The gen-

slide has a stroke of 28 in., 6 in. adjustment, 500 tons capacity, while the outer slide has a stroke of 26



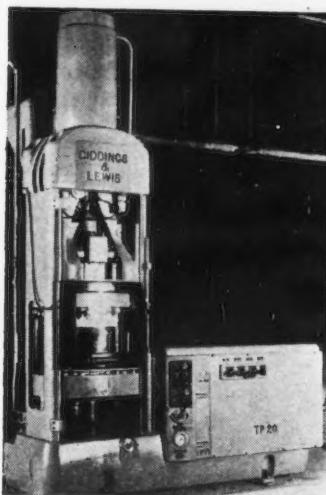
in., 6 in. adjustment and 300 tons capacity. This press operates at the rate of 6 strokes per min.

Automatic Stock Reel

4 A stock reel which unreels stock from either the top or bottom of a coil at a controlled rate as required by the die being fed, has been announced for the stamping industry by the *H. E. Dickerman Mfg. Co.* Power for operation is obtained from the press. A spring loaded feeding pawl, actuated by the press through a simple bell crank and tie rod arrangement engages a rack gear which is a fixed part of the reel hub. Unreeling is controlled by a brake and pawl lifter. Over-running is prevented by a spring loaded friction brake. The reel is adjustable vertically to suit the height of the press and also adjustable to accommodate a wide range of stock coil diameters and widths.

3-Way Tapping Machine

5 For tapping holes on the bottom and both ends of a cylinder block, *LeMaire Tool & Mfg. Co.* has developed a machine consisting of



fied, quick changing of the heating cylinders, reducing change-over time to approximately 20 min.

Plastic Heating Unit

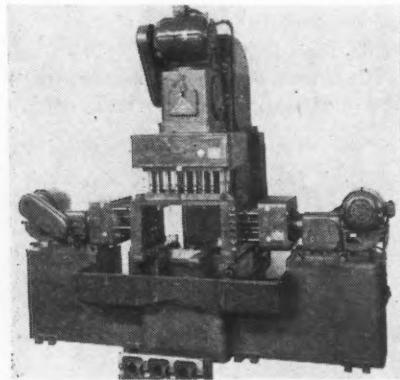
2 Known as the Vacu-Therm generator, a heating unit developed for the plastic industry is said to be capable of delivering quick, controlled heat to 550°F ±5°F under low operating pressure. The heater is described as a heavily insulated

generator is manufactured in 16, 22 and 33 kw capacity and requires floor space 72 in. long, 36 in. wide and 50 in. high.

Toggle Presses

3 A single point double action toggle press of streamline design has been announced by the *Cleveland Punch & Shear Works Co.* All the gears are enclosed in the box type crown, together with the drive unit. The press is equipped with an electrically controlled air operated friction clutch and the top cover is removable for any necessary repairs. The machine illustrated has a 28-in. stroke, 6 in. adjustment, 500 tons capacity for inner slide, 300 tons capacity for outer slide. A two point, double action toggle press having two slides, an inner and an outer, or blankholder slide is also available. The inner

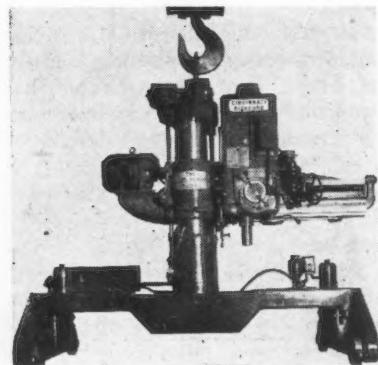
a rigidly fabricated one piece base on which No. 150 lead screw tapping units with multiple spindle heads are mounted at each end and a No. 200 tapping unit on a column is mounted at the rear. A bridge type fixture is provided which in-



corporates an air cylinder actuated toggle type elevating mechanism that jacks the part up against the pan face. Wear strips, guide rails and adjustable stops are used with manual loading for preliminary location. The machine taps 12 holes on the right end, 30 holes on the top and 6 holes on the left end of the block. Rate of production is said to approximate 72 pieces per hr. Pushbuttons control cycle start, stop, start, and emergency return.

Radial Drill

6 Announcement of a radial drill which consists of a standard machine mounted on a prefabricated steel gondola base has been made by the *Cincinnati Bickford*



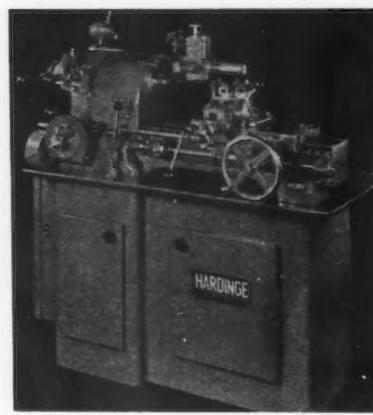
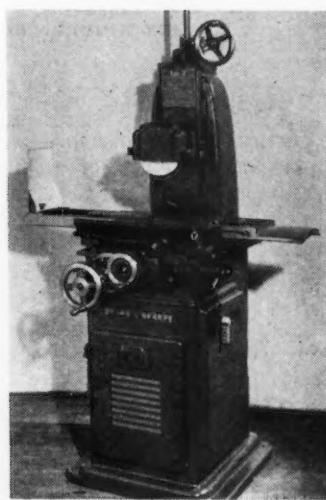
Tool Co. This 4-ft arm, 13-in. diam column portable radial has a 110½-in. wide base with hardened steel wheels, power clamping, and power traverse of 24 ft per min with push-button control located at the head

of the machine. The machine has shortened column and a large lifting bail attached to a steel cap.

Chucking Machine

7 Said to be capable of maintaining the accuracy associated with smaller diameter work, a multi-operation chucking machine for large diameter work has been introduced by *Hardinge Bros. Inc.* Filling the gap that formerly existed between the second operation machine and the large turret lathe, this machine is intended for turning, boring, or threading parts up to 6 in. diam which have been blanked out on automatic screw machines or turret lathes, or for finishing stampings, castings, forgings and other types of work that ordinarily require many individual setups. The turret, featuring eight stations, each of which may be adjusted without affecting other sta-

Mfg. Co. The machine is available either with a 1½ hp driving motor in the base or with a 1 hp motor driving the spindle directly. When motor is mounted in the base, the drive to table and spindle is pro-



tions, takes standard $\frac{3}{8}$ x $\frac{3}{4}$ -in. rectangular tools directly on the hardened and ground steel top surface. Through the use of single, double and triple tool holders, as many as 24 single-point tool operations can be performed in one set-up. The precision threading unit is separate and is controlled by a master screw mounted directly on the rear of the headstock spindle. There are no intervening gears, therefore accurate duplication of the lead screw is assured. The machine features a speed range of 150 to 3000 rpm, either forward or reverse.

Surface Grinder

8 No. 2 surface grinding machine with many improvements and selections of equipment to meet a variety of operating conditions, has been offered by *Browne & Sharpe*

vided through one endless belt concealed within the column. On the motorized spindle type machine the drive from the motor to the spindle is through a vibration-dampening coupling. This machine employs a $\frac{1}{4}$ hp motor in the base for table power feed. Two rates of table travel are provided, 19 or 31 fpm. A choice of a close fitting plain bearing spindle or a permanently sealed grease lubricated antifriction bearing spindle is available. No. 2B machine is available with hand feeds only. Both models grind work to 18 in. long, 6 in. wide and $9\frac{1}{2}$ in. high using a wheel 7 in. in diam.

2-Way Boring Machine

9 For boring large holes to accurate dimensions at a high rate of production, the 2WI boring machine has been developed by *Davis & Thompson Co.* The machine illustrated bores a $14\frac{3}{4}$ -in. diam



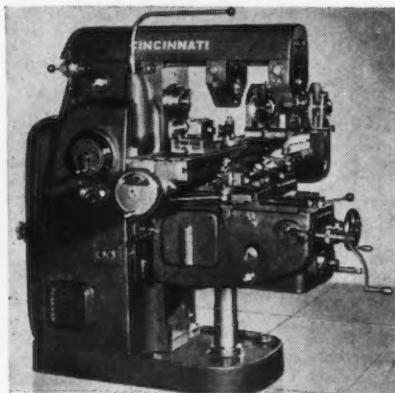
hole 12 in. deep from one side and a 9-in. diam hole 12 in. deep from the opposite side, on air cylinders for railroad locomotives. Rate of production is two parts or 8 bores per hr. The machine is equipped with an indexing table on which the fixture is mounted. When bor-

NEW EQUIPMENT

ing is done from opposite sides and work is complete, all bores are in absolute alignment, it is said. An individual drive is provided for each head, consisting of a 15 hp variable speed dc motor, a set of V belts, a set of change gears, and a gear train. A speed range of 330 to 1000 rpm is obtained by varying the motor speed and driving directly through the V belts to the spindle. Disengaging the clutch disengages the motor driven sheave, and the drive is then through the change gears and gear train to the spindle at a range of 60 to 300 rpm.

Milling Machine

10 Designated No. 2 ML, an addition to the line of knee and column type milling machines manufactured by the *Cincinnati Milling*

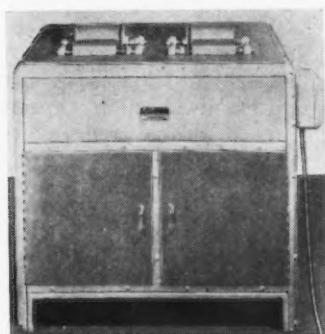


Machine Co. is offered in plain and universal styles as a companion machine to the No. 2 MI. The machine is driven by a 3 hp motor and is about 1000 lb lighter than the No. 2 MI. Wide speed and feed ratios of 60 to 1 and 120 to 1 respectively are said to cover requirements for all types of milling operations encountered in metal working industries. There are 16 spindle speeds ranging from 25 to 1500 rpm which are changed with a single crank type control. The crank operates a selector valve which shifts gears hydraulically. Rapid traverse, at the rate of 150 ipm longitudinal and cross, and 75 ipm vertical may be engaged through a lever control at the side of the knee.

Dual-Roll Lapping Machine

11 For rough and finished lapping operations on small cylindrical parts, a 2-stage lapping machine has been manufactured by *Size*

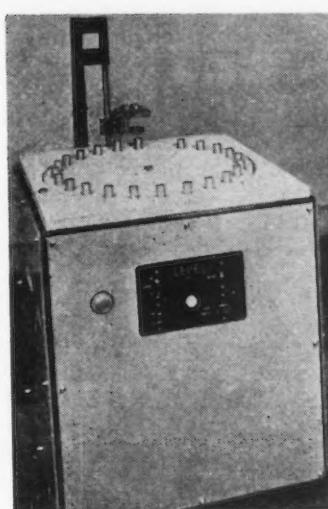
Control Co. On the left hand roll of this dual roll centerless lapping machine, rough lapping is accomplished, and on the right hand roll



finished lapping is done. These moderately priced machines with their advanced principle of lapping for the precision finishing of cylindrical pieces are said to reduce lapping time, and to obtain a precision finish of less than 2 micro-inches. One piece or many can be lapped with no necessity for making setups, ring laps or other tools.

Indexing Table

12 For soldering, brazing and annealing round or irregularly shaped small parts, an indexing table has been developed by *Lepel High Frequency Laboratories, Inc.* to heat parts where shape or control of heat requires closer or more accurate coupling than can be achieved by moving the parts through a tunnel type coil. Parts on the table are moved or indexed into heating



position, the load coil lowered to surround the part, and the heating cycle carried out automatically. Length of the heating cycle can be

varied to meet any requirements by an adjustable timer, and the index speed adjusted by changes in the variable speed drive.

Portable Induction Heater

13 Built to eliminate the necessity for a number of heaters in several capacities to handle large and small work, a portable induction heater marketed by *Electric Arc, Inc.*, is manufactured in units of 10 kva for preheating and normalizing for welding. Individual units of 10 kva each may be stacked on the job to form groups of two and three units with capacities of 20 and 30 kva, obtaining sufficient heater capacity for preheating and normalizing welded joints on pipes of large diameter. The 30 kva combination is said to be capable of preheating a 10-in. pipe joint to 1300°F in 2 hr.



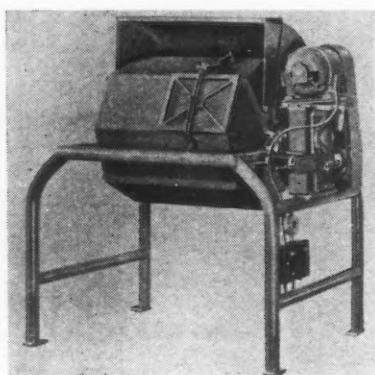
Each unit is complete in itself, containing a power unit, contactor, meters and control supply. Polarized receptacles are provided for recording job temperatures and heat cycles, for interconnection of the heater into groups and for power supply to the units.

Circuit Breaker

14 A new tripping action which combines the inverse time limit characteristics of Bimetal thermal action on overloads with the operating speed of magnetic trip action on short circuits is a feature of the Quicklag circuit breakers announced by *Westinghouse Electric Corp.* Available in a single or double pole, 10 to 50 amp, 125 to 125/250 v ac, the breaker also has a redesigned De-ion arc chute that eliminates the need for a vent screen in the bottom, thereby permitting mounting flush to panel. The new Quicklag will not require retooling or redesigning of existing fabricating facilities.

Deburring Barrel

[15] A line of 11 octagonal deburring and finishing barrels of 30 in. diam and 32 to 60 in. length, with 9 standard compartment sizes from 12 to 60 in. length, has been announced by *Almco Inc.* De-



sign features include 4-speed drive, quick-clamp doors and welded steel construction throughout. These barrels are furnished either unlined or with full neoprene lining. They are motor-driven at 10, 15, 20 or 30 rpm through a speed reducer and 4-step V-belt pulleys, a lever-operated belt release mechanism, permitting quick selection of the desired speed. To facilitate positioning of the barrel for loading and unloading, rotation in both directions is controlled by a start-stop lever.

Alloy Sprayer

[16] The Forrester alloy sprayer announced by *K. & F. Metal Spray Industries* is an all electric unit using ac or dc current and requiring 3½ cu ft of air per min at 30 to 40 lb pressure. Temperature control is adjustable from 100° to 600°F and maintained within

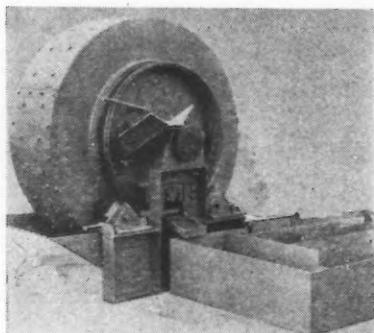


1/10°. The entire unit is sealed within a brass shell. Setting up operation only requires plugging in hose to the air pressure line. The alloy to be used is dropped into the pot and the cover locked down. Almost any kind of low temperature

metal can be handled easily. The gun heats quickly and the metal melts in approximately 2 to 10 min, it is said. Spraying is accomplished by merely pressing the button on the handle. Metal can be deposited to a thickness of 1/4 in. over a 4 x 6 in. area in less than 60 sec. The sprayer is available in three sizes, 6, 12 and 24 cu in. capacity. Models are manufactured in horizontal or vertical types.

Metal Reclaiming Mill

[17] The No. 3 size small mill designed for low tonnage milling and suitable for annealing pan, ashes, skimmings and small non-ferrous foundries refuse, has been added to the line of metal reclaiming mills manufactured by the *Dreisbach Engineering Corp.* A dustless, closed circuit specific gravity concentrator recovers all metal for remelting. The milling unit inside the drum consists of

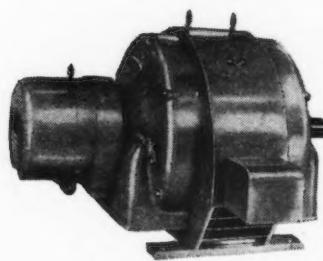


two manganese cast steel crushing rolls with herringbone corrugations. The top roll has a flexible mounting to permit various size metals to pass through without clogging. The unit conveys all feed and continues milling above water, with the power applied directly to the center crushing roll shaft from a 1-hp motor.

Splash Proof Motors

[18] Heavy-duty splash-proof synchronous motors for constant speed drives up to 1000 hp have been released by the *Electric Machinery Mfg. Co.* Brush inspection and blowing out are said to be simplified with access plates designed for quick removal and replacement. It is further stated that the sealed bearings can be cleaned and refilled without motor disassembly. Double end ventilation is provided by a blower on each end of the rotor

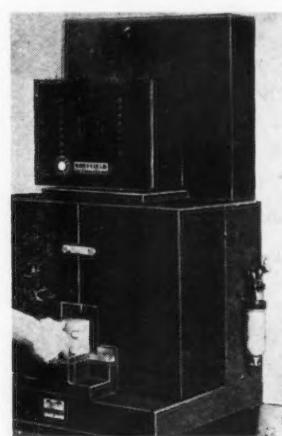
and the exciter is also fitted with a blower. These motors are recommended particularly for use in chemical plants, mining and milling



operations, for pumping jobs and other installations where splash proof construction is required.

Electric Gage

[19] Inspection of numerous critical dimensions of automotive pistons as well as eight classifications are combined into one quick operation on the Airelectric Multicheck developed by the *Sheffield Corp.* The operator merely loads and unloads the parts; accuracy of check is entirely independent of the human element. Segregation into classifications is made possible by color stamping during the gaging cycle and rate of inspection and selection is 500 to 700 pistons per hr. When the piston is in gaging position, simultaneous check is made of average diameter of pin holes at each of two bearings, diameters of four ring grooves, widths of five ring grooves and diameter of bottom



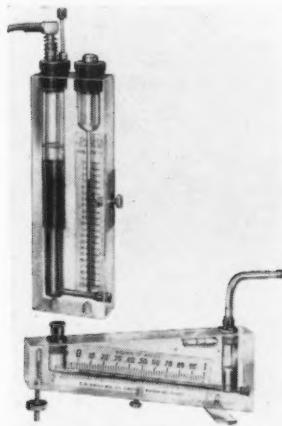
skirt. Three classifications of pistons are automatically made on the basis of the average diameter of the pin hole, selections being made in steps of 0.0001 in. between min and max tolerance limits. Red and

NEW EQUIPMENT

green signal lights integrated into one master light circuit indicate individual dimension gaging.

Combustion Testers

20 Development of a line of combustion testing instruments including portable and stationary transparent CO_2 indicators, draft gages, manometers and accessories has been announced by the *F. W.*



Mfg. Co. Outstanding among the new instruments are the Model 800 transparent CO_2 indicator and the Model 100 draft gage, illustrated. The indicator gives complete visibility and accuracy with its simplicity making it possible for an inexperienced operator to make accurate tests with little or no training. The instrument's body is of plastic which is said to remain permanently unaffected by the red indicating solution, and all metal parts are of stainless steel. The portable draft gage, also of plastic, measures all types of air velocities, drafts and slight pressure changes.

Scale graduations extend 5 in. with 1 in. of sliding adjustment. Draft indication is said to be continuous and all fluctuations may be observed while adjustments are made.

Permeability Tester

21 An instrument, designated the Permmeter, for determining the permeability of foundry molding materials and other materials has been developed by the *Harry W. Dietert Co.* It is a direct reading device which measures the air flow through specimens of material. An automatically operated electric timer driving a circular dial reading in cc air flow per min at 1 g pressure is employed with a gasometer unit. The movement of the gasometer bell automatically starts



and stops the timer unit when a given quantity of air or gas is passed through the test specimen. The instrument performs the necessary timing and calculations.

Tubular Micrometers

22 Offering greater freedom of movement with lighter touch and feel, micrometers of tubular construction have been manufac-

tured by the *Tubular Micrometer Co.* Structural weight is said to have been reduced 50 pct through the hollow frame design. Other structural features include points of wear take-up on the spindle, at the tip and on the thread. Threads are ground from solid stock and spindle and anvil are hardened to 64 Rc to reduce wear. Frame parts are electroplated with copper, nickel and chrome. Types include



conventional micrometers ranging in size from 0 to 24 in., blade type from 0 to 4 1/2 in., and roller mill types in sizes with a 3- or 6-in. throat depth.

Quick Acting Clamp

23 Developed for use with work holding fixtures or as part of conventional machine setups, a jigg-nut has been manufactured by *Jig-Nut Corp.* Made to fit standard stud threads this quick-acting clamp needs only to be screwed down finger tight without the use of wrenches or tools. More than ample clamping pressure is said to be exerted when the handle is moved from the vertical to the hori-

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

THE IRON AGE, New York 17, N. Y.

4/10/47

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PLEASE STATE BUSINESS.....

COMPANY

CO. ADDRESS

CITY..... ZONE.... STATE.....

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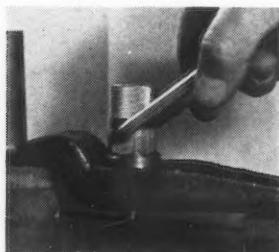
100 E. 42nd St.

NEW YORK 17, N. Y.



NEW EQUIPMENT

zontal position. In addition to being readily adjustable, this clamp is self-locking and shakeproof due to the fact that any increase in



clamping pressure results in increased locking tension. Fixtures now in use may be retained for use with the jig-nut without rede-

Electrode for Cast Iron

24 To meet the requirement for machinable weld deposits on cast iron in automotive production repair work and general casting work, *Air Reduction Sales Co.* has developed an electrode known as Airco No. 375, featuring a high nickel core wire and heavy extruded coating. Smooth flow of weld metal and sound nature of deposit are attributed to the high nickel content. The weld is said to withstand hydrostatic pressure and the electrode may be used in the downhand, vertical or overhead positions. This electrode may be used on ac or dc and is available at present in 5/32 and 1/8 in. diam.

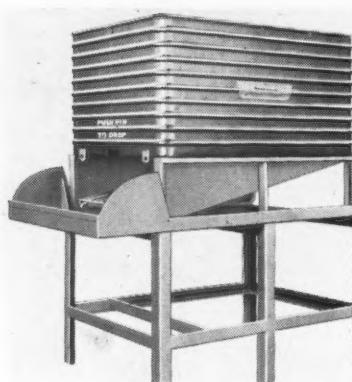
Safety Device

25 Fireye combustion control type F18TS, is announced as combining protection against oil burner flame failure and low boiler water level in a single unit. When

flame failure occurs, this device manufactured by the *Combustion Control Corp.* is said to cut off fuel or sound an alarm instantly, as it is actuated by the flame itself rather than the thermal effect of flame failure. Protection is offered against dangerously low boiler water level by means of a single probe which is mounted in an auxiliary fitting parallel to the boiler water column and wired to Fireye control. The unit consists of a phototube and amplifying system housed in a dust-tight aluminum case. For oil burner control it is mounted directly on the furnace wall and aligned in a manner which permits the photoelectric cell to observe the flame through a 2-in. pipe connection.

Drop-Bottom Skid Boxes

26 Made of corrugated hot-rolled steel and built for a load limit of 4000 lb, drop-bottom skid boxes



have been announced by the *Monroe Auto Equipment Co.* Boxes can be used as an ordinary skid box and handled by any high lift truck. The bottom of the box is hinged

and supported by two heavy pins which drop the bottom when manually released, permitting the contents to spill out on a table which is part of the stand. Stands are made of heavy-duty angle iron and are 40 in. high at the work table. Boxes and stand are supplied in 6 sizes.

Steel Skid Platform

27 All-steel skid platforms for use with hand and electric lift trucks have been announced by



Market Forge Co. They are made in any required size and for any specified lift truck. Steel deck panels made of medium gage high-tensile strength steel form the load carrying surface, resulting, it is said, in a smooth, even surface which is desirable for handling sheets of material such as paper, rubber, leather, etc. These deck panels are welded to Z bars which are the actual load-carrying members. Solid bar steel legs formed in a shape to give extra utility allow the platform to be stacked on end when empty. No bolts or rivets are used in this unit, thus reducing maintenance to a minimum. The skid platforms are available with integrally welded corner stake sockets.

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

THE IRON AGE, New York 17, N. Y.

4/10/47

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 12 13 14 15 16 17 18 19 20 21
 22 23 24 25 26 27 28 29 30 31 32

NAME..... TITLE.....

PLEASE STATE BUSINESS.....

COMPANY.....

CO. ADDRESS.....

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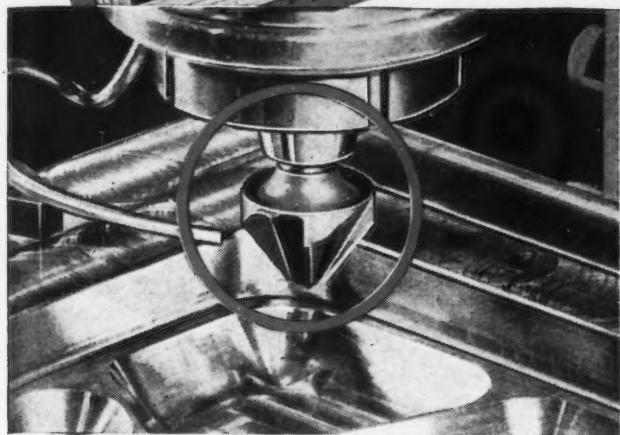
THE IRON AGE

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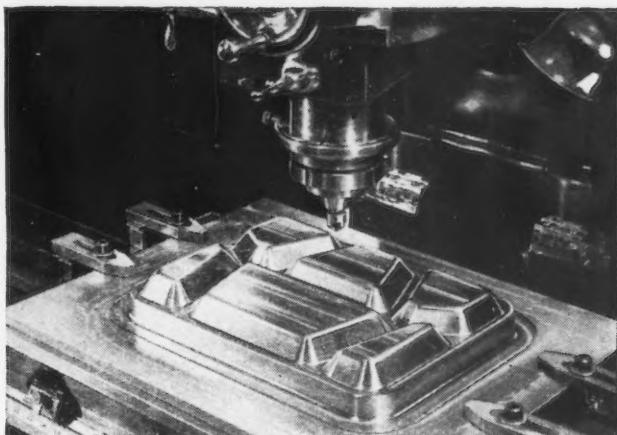
NEW YORK 17, N. Y.



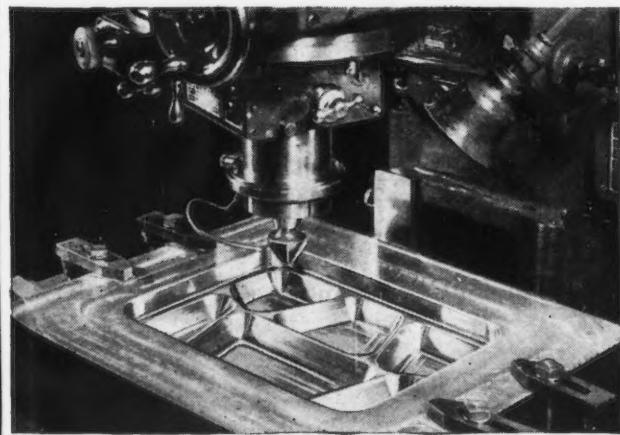
How One Machine Scribed and Machined this Complex Mold — and Made its Own Cutters!



1 **FAST!** The job, a plastic serving tray, required special angles and radii in its cavities. The Model 2D Rotary Head milling machine — a Kearney & Trecker development — completely milled the 3 special form cutters to correct size and shape, including relief and chip clearances.



2 **DIRECT!** The operator accurately located the mold blocks in relation to the Rotary Head center. All layout work, rough and finish milling then were completed with one clamping of the workpiece. No models or templets were required. The blueprint was the only guide necessary.



3 **ACCURATE!** Completing the work in a single setup greatly reduced the chance for error. Precision measuring devices and complete control of all combinations of cutter movements, both angular and radial, made this a simple job of geometric construction for the operator.



4 For more facts of how you can get Fast, Direct, Accurate results on other mold, tool, die, pattern, toolroom and general production work, using the Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

4720

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN

Assembly Line . . .

WALTER G. PATTON

• **Studebaker takes a novel step in promoting labor-management relations . . . 'Boss' Kettering tells an engineer about GM's new diesel pistons.**



DETROIT—An interesting and novel step in labor-management relations has recently been taken by Studebaker at South Bend, Ind. Since this move was made by a company which has never had a strike and also because the disclosures throw considerable light on the consequences that are likely to follow the adoption of a uniform wage pattern by the automobile industry as a whole, the recent Studebaker foremen's and supervisor's meeting is likely to assume considerable significance.

On the eve of distributing the company's financial report, 750 Studebaker foremen, assistant foremen and supervisory employees were dinner guests of Paul G. Hoffman, president, and H. S. Vance, chairman of the board, who explained in detail the financial results of Studebaker's operations during 1946.

About 650 daytime supervisors attended the dinner held in the University of Notre Dame dining hall and 100 second-shift supervisors were entertained at a luncheon held earlier in the day in the Studebaker administration building. Another meeting was held in Los Angeles for 50 West Coast supervisors.

In addition to the verbal explanation to supervisors by Mr. Hoffman and Mr. Vance of the

company's financial position and prospects for the coming year, Studebaker had prepared a condensed version of its financial statement for distribution to all Studebaker employees and dealers. The suggestion was made that the employee ask his supervisors if the report failed to answer his questions about the company's financial position.

Employees were also invited to ask for the complete financial report if additional information was desired.

The employee version of the Studebaker financial report is a brief, illustrated explanation of the company's operating and financial position. After explaining that material shortages during 1946 had forced the company to reduce its projected operating schedules from 265,500 passenger cars and trucks to 120,763 and that even during December production had only reached 60 pct of schedule, the report said:

"As a result of these conditions we lost money in 1946. Our operating loss of \$8,144,191.99 for the year was one of the largest in our history. In 1940 when we produced the same number of cars and trucks as last year, we had an operating profit of \$2,762,128.13. The difference in the results for the 2 years gives you some idea of how hard we were hit by the unusual problems in 1946."

THE report went on to show that because of the tax refund the company's operating loss was wiped out, leaving a net income of \$948,808 "or less than 1¢ out of every dollar we took in from the sale of our products."

Studebaker's simplified income statement for 1946 shows that out of every sales dollar the cost of materials and services bought from suppliers was approximately 70¢. Wages, salaries, social security taxes and employee insurance accounted for another 31¢. Charges to 1946 operations for tools and facilities total 3.71¢ per dollar of sales. With other expenses aggregating 1.8¢, costs exceeded income by 5.75¢.

It was shown that after tax adjustment, Studebaker's net income was \$0.67 for every \$100 of sales.

Total dividends paid to 22,000 stockholders (who received no dividends in 1941 and 1942) totaled \$1,177,000 in 1946 while wages, salaries, social security taxes and employee insurance totaled \$43,473,203.

Although Studebaker was able to show a small net profit in 1946 as a result of the tax carry-back provision, Mr. Hoffman warned that no such sizable refund would be available if losses occurred this year. He said that the tax credits during 1947 could not exceed \$300,000.

Analyzing the company's financial condition, Mr. Vance pointed out that most of the operating losses were incurred during the first half of 1946 and that the company was able to earn a small operating profit during the final 6 months, although average monthly operation was held to 50 pct of the present plant capacity by the shortage of supplies and materials.

STUDEBAKER has a favorable outlook for 1947, Mr. Hoffman said. Provided the material situation improves the company's production and sales during 1947 should exceed any previous year, he added.

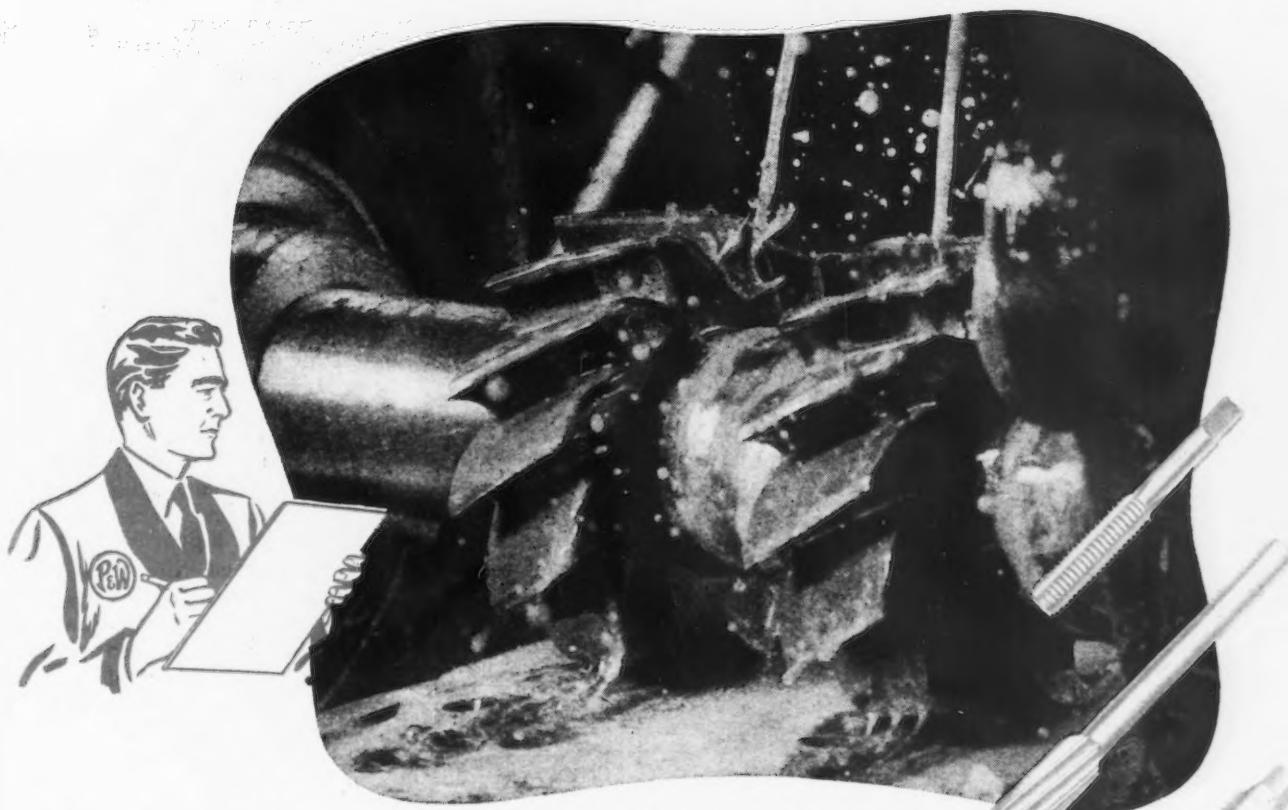
Also on the brighter side are the results of a recent survey which showed that of those people who were interviewed concerning their plans for buying a new automobile, 9 pct named Studebaker as their first choice, compared with less than 3 pct in a survey completed just prior to the introduction of current models.

During January 1947 Studebaker operated without interruption and produced 16,263 cars and trucks while 1946 output was 120,763 passenger cars and trucks according to the report. (If the January rate can be maintained for 12 months, the 1947 total would be approximately 195,000 units.)

The company spent \$13,501,088 for new tools, additional facilities and ordinary replacements during 1946 the report showed.

The financial statement also said that Studebaker truck production in 1946 was at a level four times that of the best previous peacetime year and that truck assemblies in 1947 are at a higher rate than that

Competition Ahead!



How About a Small Tool Checkup?

No room for inefficient cutting tools in the competitive battle ahead. High labor and material costs won't permit it. Manufacturing survival—even jobs—depend on efficient, fast-cutting tools that can take it on the toughest jobs.

Call in your Pratt & Whitney Engineer. As a starter, let him check up on your small tool performance. He's a specialist in speeding output at low cost. He knows how to survey a production setup against known standards of efficiency. At his finger tips are specifications on materials to be cut and the tools to cut them; data on cutter and tap performance that can save you money. To handle the toughest problems, he'll call upon the resources of Pratt & Whitney engineering and research.

He'll study your complete small tool picture and then give you a report that will show you how to cut production corners . . . send production up and costs down. And his services will cost you nothing. Here's how to get them—just write us a letter. No obligation—naturally. Ask for a fact-packed P&W Condensed Catalogue while you're writing.



PRATT & WHITNEY

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attained at any time during 1946.

The comparative statistics available in the Studebaker report are of considerable interest to anyone who is interested in management "take-home" as compared with the much talked about workers' "take-home."

Of particular interest are the comparative figures for net sales, profit before income taxes, net income, income per share, dividends and property, plant and equipment for the years 1946, 1944 and 1941, the year 1944 being the peak war year so far as Studebaker is concerned while 1941 was the last full year of passenger car production. Figures given below are thousands

the peak war year of 1944 and its net income is off from \$4,038,000 in 1944 to \$949,000 in 1946. Meanwhile, the company has paid substantially the same dividend in 1946 as was paid in 1944 while its investment in property, plant and equipment has jumped from \$10,371,000 2 years ago to \$25,913,000 in 1946, an increase of 150 pct.

Keeping in mind that Studebaker's passenger car production in 1946 was approximately 60 pct of the 1941 output, it is shown that net sales have increased from \$115,700,000 in 1941 to \$141,564,000 in 1946. The increase in sales income is accounted for by a substantial increase in truck produc-

	1946	1944	1941
Net sales	\$141,564	\$415,746	\$115,700
Profit before income taxes	8,144*	18,285	5,961
Income taxes	9,093*	14,247	3,475
Net income	949	4,038	2,486
Income per share .....	.40	1.74	1.12
Dividends	1,177	1,159	...
Property, plant and equipment	25,913	10,371	14,432

* Loss or Credit.

of dollars unless otherwise indicated.

THE above comparison indicates that Studebaker's sales income has dropped 66 pct since

tion, larger sales of replacement parts and the increased price of cars and trucks. Meanwhile, Studebaker's net income fell from \$2,486,000 in 1941 to \$949,000 in 1946 (and a loss of \$8,144,192

WATCH THE FORDS GO BY: Benson Ford, grandson of the late Henry Ford founder of Ford Motor Co., drives the 100,000th Mercury car off the line at the River Rouge plant. Beside Mr. Ford is J. R. Davis, vice-president and director of sales and advertising and M. L. Bricker, vice-president and director of manufacturing. Rear seat: (left to right) T. W. Skinner, Lincoln-Mercury, general manager; A. H. Crowley, Mercury sales manager and D. S. Harder, vice-president in charge of operations.



94—THE IRON AGE, April 10, 1947

without benefit of tax carry-back).

During the same period investment in property, plant and equipment increased from \$14,432,000 in 1941 to \$25,913,000 in 1946. The company has now invested more than \$6000 per employee, the report showed.

Studebaker's financial experience is hardly typical of the automobile industry as a whole. Nevertheless, these figures do indicate how difficult it will be to establish a wage pattern that is going to be fair to all auto producers.

Thus, despite sincere efforts by Studebaker to keep its employees informed about the financial status of the company, it remains to be seen just how much weight Studebaker's position as an individual producer is going to receive in the bigger wage controversy between the larger producers and the UAW-CIO—a controversy that now appears to be heading for a settlement as much on the basis of steel industry profits as on automobile industry profits and with little regard for the individual producers ability to pay.

THE latest addition to 'Boss' Kettering's ample fund of research stories is well worth repeating. At the recent meeting of the Society of Automotive Engineers in Detroit, GM exhibited one of its older type diesel pistons that used to run 50,000 to 60,000 miles. This piston carried a price of \$100. At the same meeting, GM also exhibited one of its newest pistons that will run 1,500,000 miles; and this one carried a price of \$50.

As Kettering tells the story, he had one of his boys at the exhibit to listen to the conversation. The 'Boss' visited the exhibit himself one day and a fellow he knew came along and said, "That piston is no good," pointing to the one that ran so long. "I wouldn't have it as a gift."

"Did you see what it says on the card?" Kettering asked.

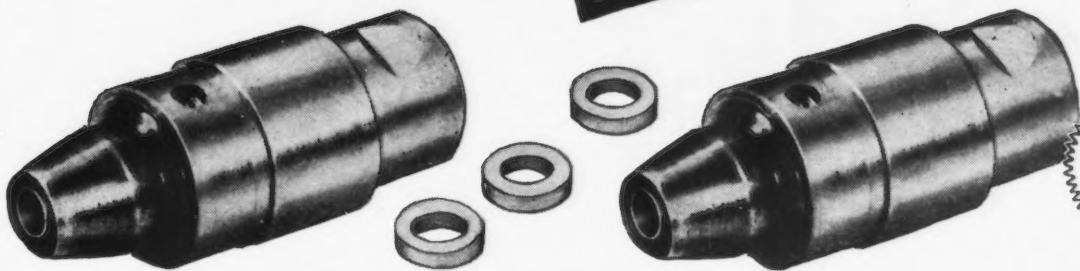
"I can tell by looking at it, it's no good," the engineer said. Then he pointed to the other one, adding, "That is the only piston that's any good."

Kettering quipped; "How long were you ever a piston in a diesel engine?"

Designed the same!

Machined alike!

Identically heat treated!



But

Why will ONE TOOL last longer,
produce more pieces per grind?

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O.K.



POROSITY

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The tool made from clean, sound and uniform tool steel will stay on the job longer, reduce costs—and it will be safer to heat treat. And here's why: The tool steel was rigidly inspected by boiling in hot muriatic acid. To successfully pass this test, known as "acid disc-inspection," the steel had to be free from harmful internal defects that often cause heat treating troubles, premature tool failures. And you can be sure of getting this extra margin of safety by using tool steels that are marked with the "DIOK" (Disc-Inspected, O.K.) Seal.

Only Carpenter Tool Steels bear this Seal. They give you this added protection against tool failure—at no extra cost. So for improved tool performance, make sure your tool steel orders specify "Carpenter." And for printed engineering and production information, or personal help with any of your tooling problems, contact your nearby Carpenter representative. Give him a call, today.

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L. W. MOFFETT

• War record of industry and workers lauded by military services . . . Army plans intensive study of metals and processes . . . Seeks industrial cooperation.



WASHINGTON—During the period Apr. 6-12, Army posts, camps and stations everywhere have been commemorating Army Week. This year military reliance upon industrial production, even in peacetime, is being emphasized as never before as the Army observes this traditional military celebration.

Hitherto confined largely to observances within the service itself, a new note has been sounded with industry and labor having been invited to take part in commemorating military traditions. Many industrial firms have brought out, dusted off, and flown once more the Army-Navy E flags awarded during the war; on its part, high Army officials have been unsparing in their praise of wartime efforts by industry and its workers and have called for continued cooperation in making the United States a strong nation as the best guarantee of peace.

There is no need to look far afield for the cause of this military anxiety for continued unity of effort. There are a number of factors which govern it. Perhaps the most basic is that out of the recent conflict grew a new awareness of the interdependence of industry and the military services. Chief of

Staff General Eisenhower emphasized this point and charted the course for the services to follow during Army Week in stating:

"The miracle of American industrial war production confounded our enemies as industry was called upon to deliver more and more with less and less . . . and just as victory could not have been won without industry's contribution, a peaceful security cannot be maintained without industry's active cooperation as a member of the national defense team."

Despite the tremendously destructive power of the atomic bomb, military officials know that modern warfare is not yet developed to the stage where it may be considered as of the "push-button" type. Progress of any war in the immediate future would still have to be measured by the industrial production thrown behind the manpower following in the wake of air attack.

UPPERMOST in the minds of military officials is the knowledge that with each succeeding war, the time grows less and less in which industrial production is allowed to get rolling. Should there be another world conflict it is justified to assume that the period of grace will have been reduced to a matter of weeks, perhaps days, instead of months.

Only partially offsetting this is the fact that some war plants have been retained on a standby status, sales of others have been conditioned by recapture clauses, and certain amounts of special purpose equipment and machine tools have been placed in storage by the armed forces. In addition to the fact that these would make up but a small percentage of real needs should an emergency arise again, there is the factor that some of these facilities must inevitably be outmoded as research and development of new items and materials progresses. For example, General Spaatz is the authority for a statement that present types of military aircraft will be outmoded within 5 years.

It is the question of whether research and development activity by this country will keep abreast of the times that is causing concern.

It is no secret that high military officials have been greatly disturbed as to what effect proposed budget cuts will have on this phase of military activities. It has been estimated by some members of Congress that the combined \$11.1 billion asked by the Army and Navy can be trimmed to around \$8 billion for the coming fiscal year.

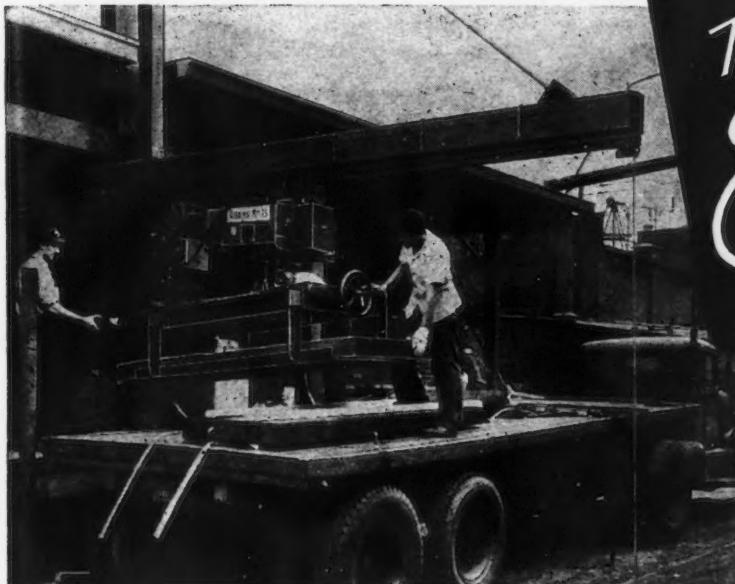
In view of the occupation duties still necessary, the combined authorized Army-Navy personnel is about 1,641,000 officers and enlisted men. Under current conditions and costs, approximately \$5.2 billion of the total appropriation granted will be required for training, feeding, clothing, housing, transporting, and medical care incidental to maintaining this peacetime force. Out of whatever is left must first be taken administration, peacetime construction, and other fixed activities before funds could be allocated for research and development.

IN this respect, three things are recognized by the armed forces, however. First, the research and development job which confronts them in the atomic age is so big and so broad that it cannot possibly be accomplished by their own personnel, whether military or civilian; next, that now the war is over, the military establishment no longer has first call upon the best minds and facilities; and finally, that in a period of economy trends the national budget can neither afford nor be expected to provide the vast amount of funds to do the necessary job.

Recognizing these things, the military pins its hope on being able to enlist the aid of private professional and industrial aid on a partial voluntary basis through emphasizing that the welfare of the armed forces is also a matter of welfare of the nation and industry.

A number of steps have been taken in this direction. Outstanding engineers, scientists and industrialists have been invited to serve on advisory committees and panels on a basis which will permit of moderate payment for the time they devote to the government. Engineering societies have been requested to undertake the study and recommendation of solutions to

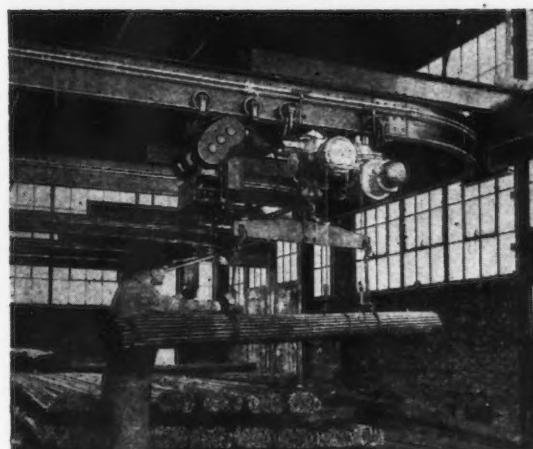
HANDLING STEEL



Power operated unit unloads steel by pushbutton control

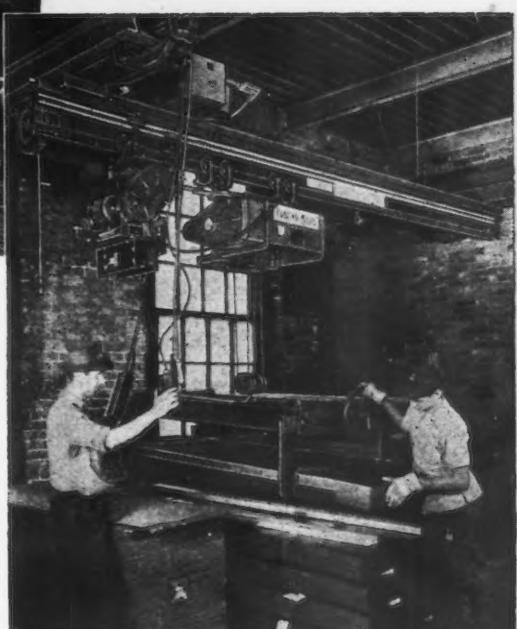


Power crane accurately spots 2-ton loads.



MonoTractor and 3-Ton hoist moves bar stock.

*The
Easy Way!*



Electric hoist with special hook, handles coils to process.

This tough job is made easy from start to finish—unloading stock from truck, to storage, to machines, to shipping—American MonoRail Systems, to fit any budget, afford faster handling, accurate spotting, reduced fatigue, added safety and greatly reduced damage.

American MonoRail Equipment saves one company \$20 on every truck unloaded; another saved \$150 in the first four months. With thousands of installations to draw from, American MonoRail Engineers are well qualified to offer solutions involving overhead handling equipment. This service is offered without obligation.



MONORAIL
THE AMERICAN COMPANY

13103 ATHENS AVE. • CLEVELAND 7, OHIO

THE IRON AGE, April 10, 1947-97

problems of national defense. Contracts have been placed with educational institutions, research foundations, engineering and industrial firms for the application of their facilities and information in the development of military equipment and items.

RESEARCH and development is closely integrated with industry although the Army and Navy are no longer major consumers of industrial production and military lines in the factories have been converted to fabrication of civilian type goods. Much of the military research and development works must be expanded through civilian contracts, largely with industrial establishments. During the current fiscal year ending June 30, more than 80 pct of the total dollar value of such contracts have been or are being placed with industrial concerns while only about 20 pct of the total goes to educational and scientific institutions and foundations.

Aside from the natural consideration it might be expected to give to the interest of national security, industry itself has a large stake in the ambitious research and development program which the Army

has outlined for itself and which it will carry out in the relative order of importance as funds are made available. Most of the fields into which the military intends to delve in its search for new information, methods and materials are of great interest to industry also.

Illustrative of this is a scheduled long-range program which involves study of metals, plastics and alloys. More specifically, the War Dept. wants to know more about the fracture characteristics of metals, welding processes, especially aluminum and magnesium alloys, and better methods and materials for protection against heat and corrosive agents.

OFFICIALS say that among other things, emphasis will be given to:

Continuation of the study of factors that influence the fracture characteristics of metals—particularly steels—and direction research along lines calculated to develop increased toughness and ductility of metals;

Investigation of factors contributing to the strength and toughness of aluminum alloys in thicknesses above 1 in. with a view to developing light-weight high-

strength alloys which might be suitable for replacing steel in ordnance items and to testing effects of various alloying elements and stress-aging treatments with the idea of developing alloys of higher strength and better weldability;

Continuation of assembly of data on magnesium alloys as a guide to the use of currently available materials and also with a view to developing magnesium alloys of higher strength;

Investigation of the factors responsible for the present low joint efficiency obtained in the welding of high-strength aluminum and magnesium alloys with a view to developing better materials and processes, particularly for obtaining welded joints of high efficiency without impairing the corrosion-resistance of the materials; and

Continuation of research into causes and action of corrosion and the development of better materials, methods and processes for protective treatment.

It might be noted in passing that, paradoxically enough, while the Army is conducting a search for tougher material for armor plate to withstand the most powerful armor-piercing projectiles, at the same time it is looking for designs and maximum penetration characteristics by which projectiles may be able to pierce the same armor plate.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Sells Surplus Property

Washington

• • • A surplus war plant in Big Rapids, Mich., which was built to manufacture machine tools will be converted to production of aluminum shapes and forms such as window sills and sashes, automobile appliances and household furniture by the Aluminum Products Corp. which acquired the property for \$86,500. It originally cost the government more than \$170,000.

At the same time, the WAA announced that it has sold a portion of the Lake Washington Shipyard, Houghton, Wash., to the Preco Corp., Bellingham, Wash., for \$75,000. This property will be converted to production of prefabricated housing units.

Built at a cost of \$134,000 to the government, it produced Liberty ships during the war; present plans call for an initial production of from five to ten housing units daily.

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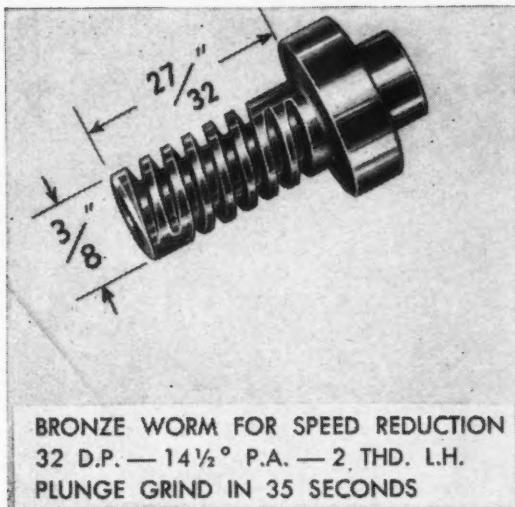
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SHEFFIELD MACHINE TOOL DATA

TFG #121

CRUSH GRINDING MULTIPLE START WORMS
ON SHEFFIELD PRECISION THREAD AND FORM GRINDER



BRONZE WORM FOR SPEED REDUCTION
32 D.P. — 14 1/2° P.A. — 2 THD. L.H.
PLUNGE GRIND IN 35 SECONDS

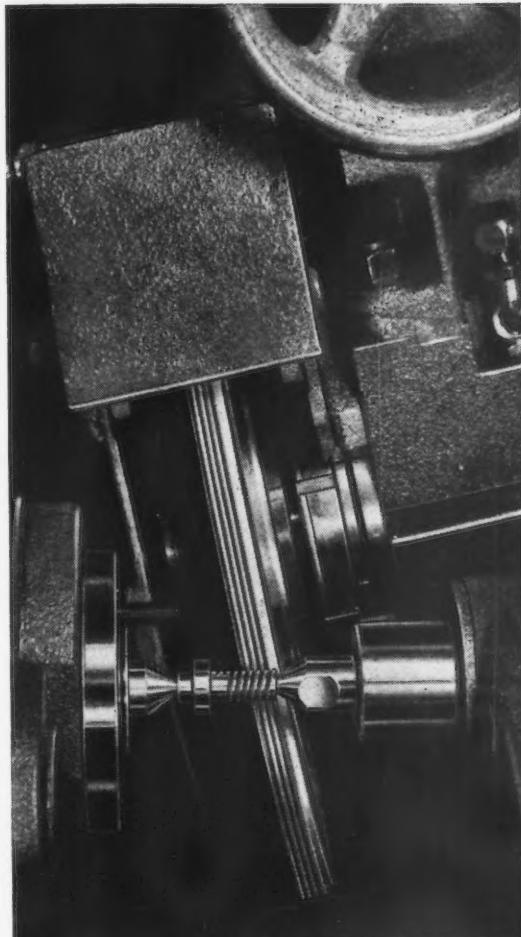
Multiple or single start worms can be quickly and economically produced by Crush Grinding with a Multi-Rib wheel.

Evidence substantiating this statement is incorporated in the following case history.

The part illustrated is a double start 32 diametral pitch worm with conventional 14 1/2° pressure angle. Material is bronze. P.D. tolerance is to be held to .003 over wires. As practically all worms have clearance between the root and the mating worm wheel, a radius at the root presents no problem in assembly.

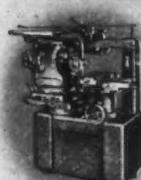
The multi-rib wheel, crush trued, was set at the required helix angle, 11° 26'. The wheel was briskly plunged to depth inside the outer center of the part so as not to cut through the thrust face. The cut was stopped close to the shoulder of the gear diameter to prevent the wheel marking the shoulder.

The grinding time of 35 seconds produced both starts simultaneously. Burrs



MACHINE SETUP TO GRIND DOUBLE START
LEFT HAND WORM WITH CRUSH TRUED
MULTIRIB WHEEL. HELIX ANGLE 11° 26'
usually produced in conventional thread
milling are eliminated by crush grinding.

In the majority of cases, crush plunge grinding of threads or forms will reduce substantially your present manufacturing costs. Write for Bulletins M-100-145 and M-120-144.



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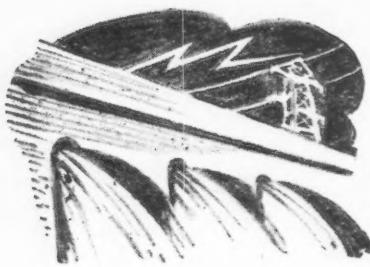
MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES



West Coast . . .

ROBERT T. REINHARDT

- Price reductions of Columbia Steel Co. welcomed, but not considered significant . . . Coal mine holiday has little effect on industry . . . Labor holds Seattle's attention.



SAN FRANCISCO—Pre-Easter sales of women's finery last week didn't surprise too many businessmen who had been well aware of buyer resistance to high prices in the retail trade. However, when Columbia Steel Co. announced price reductions of from 30¢ to \$6.80 per ton on some steel products produced at its California mills, many industrialists were caught off base.

To make the subject even more confusing, the price cuts were announced almost simultaneously with the statement of Benjamin F. Fairless, president of U. S. Steel Corp., to the effect that, ". . . no real consideration can be given by us to the adequacy or inadequacy of our current steel prices," until the industries wage problems are settled. In fact, one local newspaper printed the two stories side by side.

Trade reaction to the price reductions was, of course, favorable and consensus was that it was a step in the right direction toward reducing the differential western industry has had to pay over eastern prices. However, since the lower prices apply only in San Francisco and Los Angeles and it was understood that on shipments

to other parts of the Coast, freight would be added, jubilation wasn't universal. It was also pointed out by some buyers that culvert sheets in sizes and grades produced at Torrance, Calif., and Pittsburg, Calif., which were reduced \$6.80 per ton in Los Angeles and \$6.50 per ton in San Francisco, are in limited production.

Galvanized sheets in sizes and grades produced at these two mills were reduced only from \$4.35 to \$4.32 cwt at Los Angeles and from \$4.34 to \$4.325 at San Francisco.

Making good on its promise to pass along the savings in freight effected by the contested but recently granted rate of \$9.60 per ton, Geneva Steel Co. will deliver plates and structural to California points for \$3.29 cwt and \$3.14 cwt respectively. These prices put both Kaiser Co., Inc. and Bethlehem Pacific Coast Steel Corp. on the defensive with the former selling these items at \$3.46 cwt and \$3.41 cwt and the latter selling them at \$3.439 cwt and \$3.393 cwt in San Francisco.

There is no indication that steel products shipped to the West Coast by other U. S. Steel Corp. subsidiaries will be offered at the newly announced prices.

While not entirely lacking in appreciation for the reductions thus far offered, some fabricators are quite frank in stating that cuts in the extra list would be more to the point and have a far more reaching effect in enabling them to lower their selling costs in turn.

LIKE the dragons' teeth of mythology which sprouted men, iron ore and coke, wherever they lie, seem to demand that a blast furnace rise above them. An organization known as the Associated Mfg. & Foundry Co. of Albuquerque, N. M. is stimulating interest in ore deposits in Lincoln County which is now shipped to Pueblo, Colo., and in coal deposits in Socorro County.

According to the AM&F Co. they eventually hope to build coke ovens and a blast furnace near these mineral deposits and the "foundries of the corporation will then utilize the greatest percentage of this coke and pig iron for further processing."

LOS ANGELES—The exceptionally rapid growth of industry in Los Angeles both during and since the war has resulted in this area moving up from eleventh to either sixth or seventh place among the nation's major manufacturing centers in point of number of production workers employed. This was revealed by a survey of business conditions recently released by the Security First National Bank of Los Angeles.

The latest Census of Manufacturers, from which area comparisons can readily be made, was taken in 1939, but a rough indication of changes which have occurred since then is available from recent estimates of factory employment made by federal and state agencies. These data indicate that Los Angeles and Pittsburgh are about tied for sixth place at the present time, and five largest industrial centers being New York, Chicago, Detroit, Philadelphia and Boston—in that order.

The magnitude of the gain in the industrial stature of this area in recent years is clear. Current factory employment here is nearly double what it was before the stimulus of war orders became a factor in local payrolls. Gains in the five largest eastern and mid-western centers relative to prewar have been more moderate, ranging from about 7 pct in New York to 46 pct in Chicago.

More than half of the manufacturing employment in the State of California is currently concentrated in Los Angeles. The proportion has increased gradually from 46.3 pct in 1939 to 53.4 pct at the present time. The San Francisco Bay area accounts for 25.4 pct of the state total with the remaining 21.2 pct being in San Diego and numerous other centers.

SAN DIEGO—Recent cancellation of the YP-81 (a combination jet and propeller fighter) and the poor outlook for obtaining replacement business have caused Consolidated Vultee Aircraft Corp. to announce that they plan on discontinuing their Vultee Field Division at Downey, Calif., about July 1.

Reductions in the 3300 personnel at Vultee Field are planned on



Molder of Metallic Words

Nimble fingers glide over the keyboard with a deceptive ease . . . molten metal gushes against the brass matrices . . . and the clicking machine spews forth line after line of shining type.

A linotype operator serves a long apprenticeship before he can set column after column of "clean" copy with the speed required in the publishing business. He can't acquire his skill quickly.

Neither can a company learn to build clutches and hydraulic drives in a few months . . . or even a few years. But 29 years of specialized experience in designing and

building power transmission units enables the Twin Disc Clutch Company to meet the most exacting demands of hundreds of manufacturers and thousands of owners of equipment in which power is transmitted.

It pays to have such experience working with you in selecting the proper clutch or hydraulic drive for the specific job you have to do. It will pay you to request the reliable recommendations of experienced Twin Disc engineers in solving your power transmission problems.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois)

Heavy Duty Clutch Hydraulic Torque Converter Hydraulic Coupling

Reduction Gear Marine Gear

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

a progressive schedule during the 90-day intervening period, I. M. Laddon, executive vice-president of Convair said.

In recent months the Vultee Field Division has been manufacturing B-36 bomber components. This work will be returned to the Fort Worth Division. In addition to manufacturing operations, the Vultee Field plant has been engaged in experimental programs for the Army and Navy. These projects have been moved to Convair's San Diego plant. During the war the Vultee Field Division turned out more than 13,000 basic trainers on an assembly-line basis.

Convair's new 4-jet-propelled XB-46 bomber made its first test flight last week culminating 2 years of secret construction. Top speed and other operating data are still under wraps although it has been estimated the ship will exceed 500 mph.

SALT LAKE CITY—Workers in all Utah and Wyoming coal mines, except small, non-union truck pits, observed the memorial holiday called by John L. Lewis, but the work stoppage had no short-term adverse effects in this area except on the coal mining industry itself and the transporting railroads.

Geneva Steel Co., chronically short of coal last winter, has built up substantial storage of both coal and iron ore—enough for about 1 month's operation. Utah Power & Light Co., which foresightedly accumulated a large reserve during the slack season last summer, has enough coal for at least 90 days. Adequate commercial supplies were on hand to meet all demands.

The Geneva plate mill is currently rolling between 40,000 and 45,000 tons per month, a near-capacity operation on a 5-day week basis.

The town of Dragerton, recently purchased from War Assets Administration by Geneva Steel, has been officially taken over by the purchaser. John W. Galbreath & Co., acting as managerial agent for the steel firm, is operating the community and will, as rapidly as possible, carry out the terms of the bid. These terms provided for incorporation of the town, transfer of public facilities to the municipality, school board and churches and subsequent sale of

homes to occupants who desire to purchase.

SEATTLE—Reflecting the result of material shortages and changes in aircraft as demanded by new governmental regulations, William M. Allen, president Boeing Aircraft Co., reported a net loss of \$327,198 for the year 1946 after transfers from reserves and estimated tax refunds.

Reiterating a previously expressed belief that the aircraft industry as a whole must depend to a large extent upon government contracts to maintain production and production facilities at a high level as a matter of national defense, the aircraft executive pointed out that his company is in a sound financial position with a series of new aircraft and a substantial immediate backlog of unfilled orders as a bulwark against anything like a recession.

Partially because of the material shortages which made it impossible to deliver new model aircraft during 1946, a backlog of unfilled orders of \$210,389,000 was developed as of the end of 1946. Of this amount, only \$75,773,000 represented commercial planes and the remainder was for military craft. The commercial backlog was almost entirely for the famed Stratocruisers, 55 of which are on order for six major world airlines.

Boeing is now considering an incentive plan which will provide for the distribution of up to 6 pct of net profits before taxes, to officers and employees selected by a 3-man, nonparticipating committee. The payments will be for substantial contributions to the success of the company. One of the provisions of this tentative plan now up for stockholders' approval, is that no officer or employee will be entitled to receive more than 5 pct of the total. It is anticipated that awards of more than \$500 would be paid, at least in part, in stock in the company.

The labor situation at Boeing continues quiet although the contract between the company and the Aeronautical Mechanics Union, Local 751, has expired and negotiations have been under way for 2 months. No strike notice had been filed last week and there is no evidence to indicate that this will be done immediately.

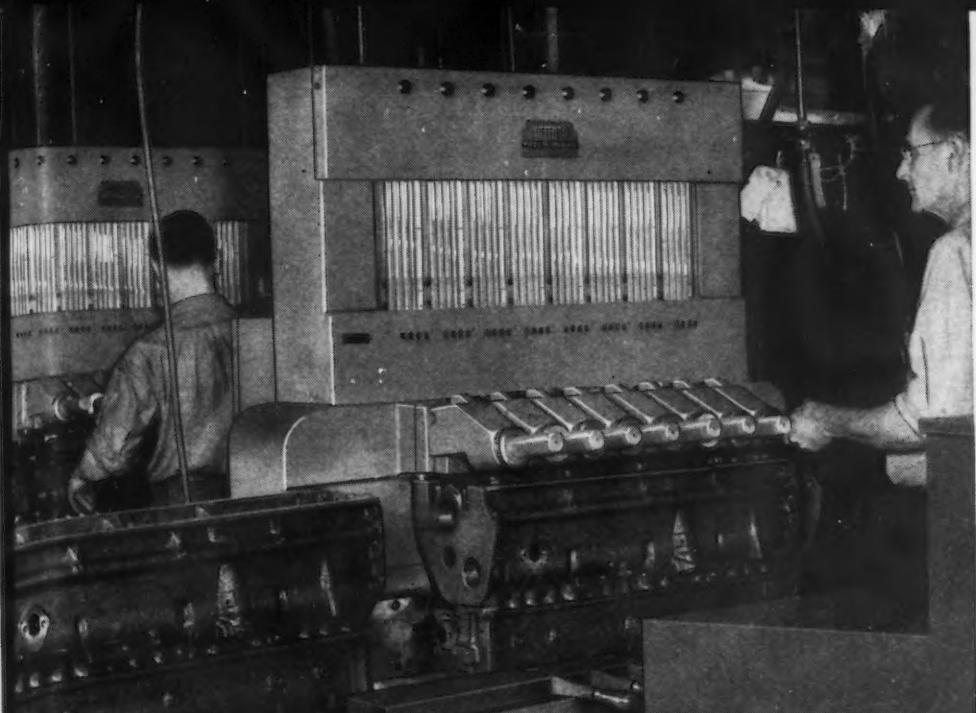
Other metalworking industries are keeping a weather eye on the labor situation which is reaching a critical period in this area. The International Assn. of Machinists, Hope Lodge, No. 79, has already filed notice of intent to strike and as they represent approximately 5000 members, this action is of considerable importance. Union leaders contend, however, that filing of this notice does not mean that a strike is inevitable but merely protects the group in the event a strike is deemed necessary at the end of a 30-day waiting period.

The Metal Trades Council is now negotiating on behalf of several AFL unions, including the blacksmiths, boilermakers and ironworkers and are said to be representing approximately 2000 employees in 100 shops. In fact, if this group called a walkout practically all the principal industries in the area would be crippled except the aircraft plants and the shipyards which are negotiating separate contracts.

In general it appears that the most important matters for discussion in all negotiations relate to so-called fringe issues rather than heavy, weighty demands. Although none of the union officials will be quoted, there seems to be a feeling among them that the prices of goods have reached their peak and are starting down so that increases in wages are highly problematical. Matters pertaining to union security, paid holidays, paid vacations and other benefits of that nature, are most prominent in the discussions.

THE Army tug MTL-951, which is equipped with a new and revolutionary Kirsten variable pitch cycloidal propeller which created a mild sensation last summer because of its performance which demonstrated extreme flexibility and control, is now enroute on the deck of a freighter to Fort Eustis, Va., for further testing. The Navy has a ship equipped with a similar propeller, but of the fixed-pitch variety.

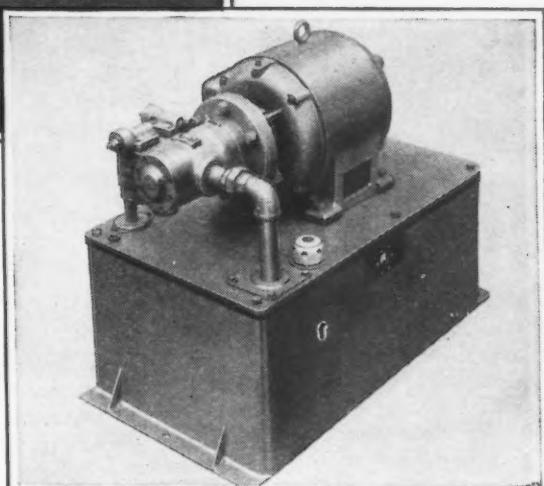
Pacific Car & Foundry, the firm which built the two propellers, is doing further research and development work with them designed to expedite commercial production.



At Left: Sheffield Precisionaire Gaging Machine simultaneously checking 32 points of inspection.

This is one of a series of applications pointing out the many advantages of Vickers Hydraulic Controls.

Below: Vickers Hydraulic Power Unit installed in base of Sheffield Precisionaire Gaging Machine.



COMPLEX MOTIONS of this AMAZING GAGING MACHINE MADE SIMPLE BY VICKERS HYDRAULIC PUMPS AND CONTROLS



Sheffield Precisionaire Gaging Machine simultaneously measures the diameter at four points in each of 8 cylinders in a motor block—

32 points in all. Each bore is then stamped with its true diameter for selective assembly. At the rate of 50 blocks or more per hour, the savings made by this machine have been spectacular.

The machine must make a complex series of motions on each block: (1) ram pushes block into position, (2) two rams from behind push block against stop for accurate transverse location, (3) plunger from above engages hole for accurate longitudinal location, (4) gaging plungers come up simultaneously—one for each cylinder, and (5) withdraw

gaging plungers and locating plunger, then return ram.

One push button puts motions No. 1, 2 and 3 (above) into automatic operation; another push button actuates motion No. 4 while a third actuates motion No. 5. To get them all into limited space with proper sequential timing by any other means would have been a difficult problem for the designer. But Vickers Hydraulic Equipment simplified the job. Hydraulic pressure is supplied by a Vickers Power Unit which consists of motor, tank, pump and relief valve all in one compact assembly ready to connect to the hydraulic circuit:

The Vickers Application Engineer nearest you can undoubtedly show you highly satisfactory hydraulic solutions to machine control problems similar to your own.

VICKERS Incorporated

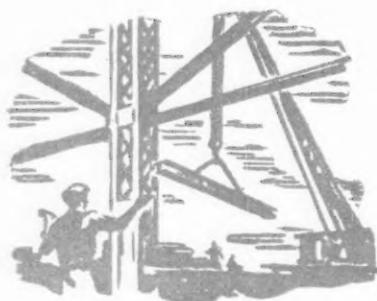
Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
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ENGINEERS AND BUILDERS
OF OIL HYDRAULIC
EQUIPMENT SINCE 1921

European Letter . . .

JACK R. HIGHT

- Large backlog of orders plus additional priority allocations, now under consideration, harassing British steel distribution . . . Shipbuilding industry will be hardest hit by priority program.



LONDON—The full effects of the winter's production problems are still reflecting themselves strongly in steel output figures, and steel mill planning for the second quarter of this year is in a decidedly tentative stage as a result of uncertain conditions. Generally speaking the same allocations program which was used during the war is still in effect in the British steel industry, but conditions have changed considerably since the end of lend-lease. In contrast to the wartime days when exports from America kept the British industry in a generally comfortable state as far as steel supplies were concerned, the British steel industry has watched its backlog of orders at the beginning of each quarter grow steadily since the middle of 1945, until at present the second quarter will begin with a larger carry-over than is expected to be produced during the period.

This carry-over, plus additional new priority demands made urgent by the winter's economic crisis, combine to make the British steel distribution picture a discouraging one at the moment. At this writing the government is considering the assignment of new priorities for the following in-

dustries: Coal mining and mining machinery, transport, heavy electrical generating machinery, gasworks, atomic energy, and the equipment necessary for conversion of industry from coal burning to oil burning.

In theory if the British steel allocation system were working completely efficiently there could be no need for any additional priorities, but in actual fact the tremendous build-up of backlogs has put the steel industry in the position where, despite any new paper which the Ministry of Supply may issue for steel allocation in the second quarter, it will have only a theoretical effect on where the steel goes during that period.

In order to avoid completely upsetting the established steel allocation and distribution system, it is probable that the new priorities—they should be approved before this letter reaches print—to be offered to the industry will be on a more or less informal basis. It might take the form of a statement to the effect that, without the direct application of an overriding priority for these particular products, when it becomes necessary to default on deliveries, steel for these particular consumers should be the last to be affected.

FOR the most part these priority consumers are actually rather small tonnage users, although of course the transport and machinery industries are not negligible. In general the program for the second quarter will be an availability of 2 million long tons of finished steel for all United Kingdom consumers. This compares with a normal availability of 2,500,000 tons.

The system in Britain is that, after the industry has informed the Ministry of Supply of this tonnage availability figure, a Cabinet committee determines which of the government ministries shall get various portions of the steel that is available. It is likely for the second quarter that the new priority industries will get 100 pct of their requirements, and that nonpriority consumers will probably receive about 70 pct of their requirements. In fact some consuming industries appear to have been notified already to that effect.

Since the beginning of the year, the steel industry has been operating with the guidance of an informal system of priorities for some of the industries which are to be included in the new order as a result of earlier Cabinet action. Thus the mining machinery industry, electrical generating equipment and steel for conversion of plant from coal to fuel oil have been the recipients of some special consideration from the steel industry during the first quarter of this year.

The steel product which will be most seriously disrupted by the priorities demands will be light plates from three eighths of an inch down to one eighth. This is already a serious bottleneck in supply, and by unfortunate chance several of the priority industries make their heaviest demands in this field. It seems certain that with normal planning priority demands will take up most if not all of the regular production of light plates. Plans are already afoot to increase production to avoid as much as possible of the obvious dislocation to nonpriority consumers which would be the immediate result of a complete cut-off in their supplies.

THE plate mills will have to roll a larger proportion of light plate in order that the shipbuilding industry and certain sections of the machinery industry which are nonpriority consumers may receive a balance of steel products and thus avoid complete shutdowns. The British shipbuilding industry which is producing more than half of the total shipbuilding tonnage under construction in the world will be the hardest hit by the program, and strong pressure is expected from the industry to minimize the reductions. The step is, of course, as distasteful to the steel industry as it will be to the regular consumers of the light plate, as rolling an undue proportion of light plate will make operation uneconomical as far as the mill is concerned.

There will also be some embarrassment in the motor car industry inasmuch as some of the automotive firms use light plates in their chassis work. Because part



Quality components will be the buyer's surest guide to quality products in the new era of competition. Manufacturers who can stress the quality of essential components will have first claim on purchasers' dollars.

Industrial designers and engineers who specify Follansbee specialty steels are projecting Follansbee time-proved quality into their new products; they are helping to establish their products in a market where the buyer will be king.

It is true that Follansbee Steel products are still in short supply. But it is just as true that the specifications for Follansbee specialty steels are rigidly maintained. Therefore, you can plan to use Follansbee steel in products now in the design stage. Just tell us what types and quantities you will need and when you will need them so that we can advise you as to availability.

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POLISHED BLUE SHEETS • SEAMLESS TERNE ROLL ROOFING

of the industry uses built up sheets for the same purpose, the effect of the reduction of light plates supplies will be unequally distributed in the automotive trade, and further dissension may be expected from this quarter.

Action is being taken by the steel industry to attack the problem of backlog as well as heavy ordering for the third and fourth quarters of this year in order to permit a more flexible distribution program. Practice in the British industry in the past has been that carry-overs undelivered in one quarter remain on the books for the succeeding quarter. This backlog now totals about 2½ million tons, in comparison with the expected availability of only 2 million tons.

As previously announced, the decision has already been made to cancel all orders placed on mill books before Sept. 30, 1946, which have been undelivered at the end of this month. This step will probably cut the backlog about in half, and the possibility of carrying this policy even further and wiping out all orders carried over from the end of 1946 is being seriously considered.

To permit as much long-range planning as possible, the government policy has been to allow any consumer who receives an allocation during one quarter to place forward orders for the following periods. Thus in the previous practice a consumer who received an allocation of steel for the second quarter of this year would be permitted automatically to place orders with mills up to 70 pct of that amount for the third quarter, and up to 50 pct of that amount for the final quarter and succeeding quarters.

Thus in effect the government was guaranteeing to consumers that their allocations would not be cut more than 30 pct for the succeeding period. These percentages applied to generally reduced allocations for the second quarter mean that in most cases consumers can only place for the third quarter about 50 pct of a normal quarter's allocation, and only about 30 pct for the final quarter.

This ruling was unfortunately misunderstood by at least one British steel consumer who assumed that the order meant that he



TARGET FOR 1950: As anyone can plainly see this Russian poster sets 25.4 million tons of steel as the target for 1950. The message at the foot reads, "So that we shall become stronger let us produce more steel!"

was being cut in the third quarter to half his steel requirements, and that he would be cut in the final quarter to 30 pct of it. The order, of course, was designed only to limit forward ordering, and has little actual bearing on how much steel may be available until the question of eliminating existing backlog has been finally settled and the precise tonnage requirements of the new priorities are definitely established.

British to Exhibit At Fair 30-ft Lighthouse

London

• • • A 30-ft lighthouse with a luminous strength of nearly 4 million cp is being erected inside the halls of Olympia, famous exhibition site in London. It will be a dominant feature at the 1947 British Industries Fair which opens simultaneously in London and Birmingham on May 5.

Already earmarked as one of the outstanding exhibits of the Fair, it will be shipped at the conclusion of the Fair to Yttererne, off the west coast of Norway, to replace a lighthouse taken away by the German forces during their occupation. There, it will beam a triple flash concentrating nearly 4 million cp every minute, each flash lasting

THE "black market" steel operators from the canyons of Park Avenue and lower Broadway are making approaches to steel starved British consumers as well as to Detroit consumers. The Ministry of Supply is convinced that most of the so-called offers to furnish steel involve only a very few lots. Just as an indication of how the market goes, electrical sheets have been quoted up to three and four times the normal price to prospective United Kingdom victims.

The authorities are, however, refusing to permit any British firm to cut into this market by keeping a tight check on import licenses. There will be some special cases, however, where imports may be permitted to harassed British steel consumers. For example, small tonnage consumers in the United Kingdom which are branches of American firms and which are getting a maximum of assistance from the very small export from America, possibly with the assistance of their parent organization, are being permitted to do so. The trickle of imports from the United States against last year's orders continue to come in at the rate of 30,000 tons to 40,000 tons per month, but aside from this the British industry is getting comparatively little help from outside. Imports from Australia remain inconsequential, although the assistance being offered by Canada is somewhat better than was expected.

half a second. Passing ships will point to it as one of the most powerful beacons in the world.

In clear weather conditions, this lighthouse will be visible 40 miles away. Meantime, it will be visible to thousands of buyers and trade representatives inspecting the Olympia section of the British Industries Fair.

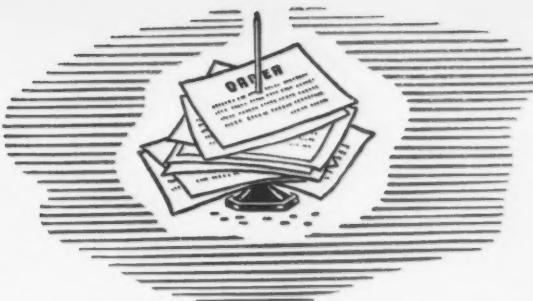
The Yttererne lighthouse is only one of many new sets of optical apparatus being manufactured in Britain. For today, lighthouses and their equipment are needed all over the world as a result of the losses and the gap in maintenance caused by the war.

Several factories in Britain are working over-time to cope with urgent orders from Yugoslavia, Finland, Norway, China, India and the Dutch East Indies.



SPECIFICATIONS

Capacity: Inner slide 290 tons
 Outer slide 500 tons
 Stroke: Inner slide 42"
 Outer slide 36"
 Strokes per minute: 4 and 3
 Bed Area: 100" x 168"
 Die cushion equipment: 138 tons
 at 100 lbs. air pressure



One Press for Many Jobs —and PROFIT Every Time

Ability to "earn its keep" in a job shop is a severe test of the versatility of any equipment, and especially so of larger machinery like this 1200-ton double-action Clearing press. Yet this ability to handle a wide variety of work, all on a sharpened-pencil basis, and produce a profit doing it, is often the factor which determines whether a press should be purchased.

The design and construction of Clearing presses merit special attention when consideration is given to varied possible uses. For example, the inner slide of the press shown here has a 42" stroke, long enough for any likely need. Despite this unusual length of stroke, the slide is held parallel to the bed by the exclusive Clearing practice of plunger guiding in the crown in addition to the extra long adjustable gibbs. Precise position is therefore maintained at every point of the working stroke regardless of its length.

The precision and the flexibility resulting from Clearing design and craftsmanship are thus further assurance of profitable operations, now and in the future, when you put your press problems up to Clearing. There is no cost, no obligation involved when you consult our engineers.



MECHANICAL AND HYDRAULIC PRESSES • 45 TONS CAPACITY AND LARGER

CLEARING

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS



Dear Editor:

SHIPBREAKING FOR SCRAP

Sir:

Referring to Gene Hardy's article which was published on p. 110-111 of the Jan. 9 issue, and is in connection with shipbreaking for scrap metal purposes. We know that either the Maritime Commission, the Navy Dept. or the Shipbreaking Consultant, CPA, issues a pamphlet in which the list is given of vessels which are out of service and for sale. We are interested in receiving a copy of this pamphlet in which we think the basic price of each vessel appears.

LA CANTABRICA

Buenos Aires

• In checking with CPA and the Maritime Commission, it appears that no such listing of U. S. ships to be sold for scrapping purposes, is available. When ships are offered for sale, individual invitations to bid are sent out to interested parties. However, since the shipbreaking program was inaugurated to alleviate the domestic scrap shortage, vessels in the U. S. are not sold outside this country for breaking purposes. Vessels in foreign ports, of course, are offered to any and all bidders. At the present time, we are informed, there is only one vessel available in S. A., and that is one lying on a beach in Peru, broken in two.—Ed.

STAINLESS STEEL FILTERS

Sir:

In your Mar. 6 issue in Newsfront, you speak of a development of a new type of stainless steel filter. I would appreciate your putting me in touch with the people who can give me more information about this new development.

CHASE MORSEY, JR.
Assistant to the President
Dazey Corp.
St. Louis

• Additional information concerning the stainless steel filters, which are made from sintered stainless steel powders, can be obtained from Micro Metallic Co., 99-16 Metropolitan Ave., Forest Hills, N. Y.—Ed.

SPRAYED PLASTIC COATING

Sir:

In the Feb. 20 issue under Newsfront the second paragraph has reference to a sprayed plastic coating for the interior walls of the spray booth. Would you kindly send the address where information on this item may be obtained.

LOUIS THURINGER
Purchasing Agent
Royal Metal Mfg. Co.
Chicago

Sir:

In Newsfront, issue of Feb. 20, you mention a sprayed-on plastic coating used to peel paint accumulations from paint booths. I would appreciate some further information on this.

The use I am thinking of is as a coating on a car finish. We are troubled here with remarkably adherent deposits from industrial fume, removable only with acid. (The fume is, of course, always from the other fellow's plant.)

G. W. HEALY

Electro Metallurgical Co.
Niagara Falls, N. Y.

• The manufacturer of the sprayed-on plastic coating is Better Finishes & Coatings, Inc., 268 Doremus Ave., Newark 5, N. J.—Ed.

IDENTITY OF OLD MATTOCK?

Sir:

I have secured your name through one of our guests . . . who has told me that possibly I could have identified



through your publication, an old mattock that has some history behind it. A photograph of the mark—Y. (anchor) P.—on the side of the mattock is enclosed. Any information that you can give concerning the identity of this tool I would greatly appreciate. . . .

ROBT. VAN LAHR
Manager

29 Palms Inn
Twentynine Palms, Calif.

• Can some reader identify this mattock?
—Ed.

RINGWOOD IRON MINES

Sir:

Will you kindly send me the address of H. P. Moran who recently purchased the Ringwood Iron Mines as stated in the news item on p. 111 of the Mar. 13 issue.

JOHN J. SULLIVAN
President
St. Lawrence Quarries
Gouverneur, N. Y.

• Mr. Moran's address is c/o Moran & Fenneman, 55 Liberty St., New York 5.—Ed.

TUBE BENDING

Sir:

Technical information on advanced production methods developed by private industry is relayed by the Bureau from time to time to supervisors of naval industrial activities to stimulate ready acceptance of better tools, materials and methods. A recent study made of "Tube Bending" includes a reference to an article in the June 17, 1943, issue of THE IRON AGE. The Bureau has received requests for copies of this article and

it would be appreciated if a copy of the article could be sent to us.

JOS. DE FEHER

Bureau of Ships
Navy Dept.
Washington

• We are forwarding tear sheets of the article, "Douglas Tube Bender Speeds Output."—Ed.

OXYGEN IN STEELMAKING

Sir:

. . . I am anxious to obtain a copy of the article entitled "Oxygen in Steelmaking," which appeared on p. 45-50 of the Nov. 28, 1946 issue.

ERNEST WOODCHEK
Administrative Secretary
International Labor Office
Washington

• Tear sheets have been forwarded.—Ed.

SHOT PEENING

Sir:

We would appreciate receiving tear sheets of the article appearing in the Jan. 9 issue, entitled "Influence of Shot Peening on Fatigue Strength of 14ST Alloy," by C. B. Gleason . . .

W. A. WITHAM
Asst. Mgr. of Engineering
Western Gear Works
Lynwood, Calif.

METALS SCRAP PRICES

Sir:

Your magazine has served me well in my line of work. I am very much interested in the scrap prices for aluminum and nonferrous metals, but have some questions about them. Does locality have anything to do with the prices you quote? What are the prices based on? Are the scrap prices on aluminum f.o.b.? I would appreciate any information you can give concerning scrap prices.

R. R. SMITH
Surplus Materials Salesman
Consolidated Vultee Aircraft Corp.
Stinson Div. Wayne, Mich.

• The prices we quote on nonferrous scrap metals are dealers buying prices f.o.b. New York City in cents per pound. These prices vary in scrap producing and consuming districts throughout the country but, by and large, there is a relationship between prices for the same type of scrap in different districts. Where the difference is significant, shipments would tend to equalize the difference.—Ed.

METAL FINISHES

Sir:

Please send me two copies of your booklet of four articles on "Metals, Finishes, and Finishing Processes" by Edward Engel, Consulting Engineer, Colonial Alloys Co.

D. M. JOHNSON
5119 W. 23 St.
Chicago

• The booklet is available to readers at 50¢ a copy. Two copies have been mailed to you.—Ed.

New Giant Bases Built from Welded Plate

BY A. E. LOFQUIST, MGR. OF FABRICATED PLATE DIV.
R. C. MAHON COMPANY, DETROIT, MICHIGAN

Press beds and die bases weighing 23 tons to 25 tons each, formerly built from structural members, are now being fabricated from plate for lower costs, greater strength and permanent rigidity. The former design, involving channels, I-beams and angles, had stresses concentrated at the joints; it was ungainly and costly, requiring expensive layout and assembly. Redesign for plate construction has made stress distribution uniform, has given our customer a better product, with more attractive appearance.

The 25-ton press bed shown in Fig. 1 is one of 16 of this modern design, welded from $\frac{3}{4}$ " and 1" plate. This pedestal, 11 ft.-4 $\frac{1}{4}$ in. wide, 19 ft.-6 in. long and 14 ft.-10 in. high, will be installed in a pit, its top flush with the shop floor and will support a giant press.

The base shown in the foreground of Fig. 2 is a 23-ton die bed, built from plate as heavy as 3" thick and from formed sections.

Special procedures were not necessary to control warpage and distortion because proper design kept this to a minimum. Reasonable care was used to properly balance welding from side to side.

New Electrode Simplifies All-Position Welding

The large size of these weldments makes it impractical to use positioners in order to get all downhand welding, but the bases are turned over from one side to another and end to end, to eliminate vertical and overhead welding in almost all cases.

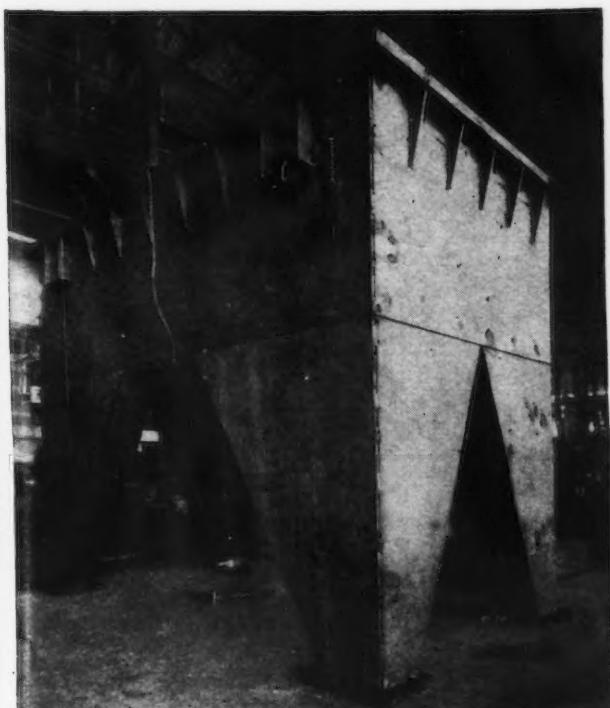


Fig. 1. Welded pedestal . . . about 15 ft. high.



Fig. 2. Die bed . . . weight 23 tons.

In this welding, involving fillets, corner joints and bevelled butt joints in heavy plate, we have used the new Lincoln "Fleet-weld 47" extensively so as not to sacrifice time or quality. It is also used for the welding of fillets in the lighter plate of various attachments and stiffeners.

In making horizontal fillets, we lightly drag the coating of the electrode on the flat plate, maintaining a space of $\frac{1}{8}$ " to $\frac{1}{4}$ " between the electrode and the vertical plate. This makes the weld "feather" into the vertical plate.



Fig. 3. Welding vertical corner joint in press base.

We use this E-6013 electrode in sizes as large as $\frac{1}{4}$ " for vertical welds, resulting in speeds up to 40% faster than with small size electrodes. Welds are made vertically upward with single pass weave.

Further information on the procedure for this electrode may be obtained by writing The Lincoln Electric Company, Dept. 144, Cleveland 1, Ohio.

Advertisement

PERSONALS

• **Stowell C. Wasson**, manager of National Malleable & Steel Castings Co.'s two Chicago works at Cicero and Melrose Park, has been elected a director of the company. Mr. Wasson's entire business career has been spent with National Malleable, beginning in the purchasing department of the Indianapolis works in 1911. He was transferred to the sales department in 1920 and became Indianapolis sales manager a year later. He was promoted to works manager in 1929 and in 1943 was made manager of both Chicago plants.

• **William Honaker** has been appointed assistant in charge of furniture sales to Robert D. Becker, manager, housewares and furniture division, Reynolds Metals Co., Louisville, Ky. Mr. Honaker began his career with Reynolds 6 years ago as a metallurgist and served Reynolds in several capacities on the production of aircraft aluminum and other war materials. He left Reynolds soon after the start of the war for service in the Army. Since his release from the Army, Mr. Honaker has represented the Reynolds housewares and furniture division in six southeastern states.

• **Arthur A. Atwell** has been elected a director and senior vice-president of U. S. Broach Co., Detroit. **E. H. H. Graf** has been elected vice-president in charge of sales and engineering.

• **J. F. Berger** has been named assistant sales manager, woven wire fabrics division, John A. Roebling's Sons Co., Trenton, N. J. Mr. Berger has been with the company for 37 years.

• **T. W. Plante** has been appointed superintendent of the Eliza Dept. of the Pittsburgh Works of Jones & Laughlin Steel Corp. Mr. Plante started to work for J&L at its Pittsburgh Works Eliza Blast Furnace Dept. in 1923. In 1929 he was made assistant superintendent of this department. He was transferred to the Jones & Laughlin Otis Works in Cleveland in 1943 as superintendent of blast furnaces, coke works and docks, which position he held until his present appointment.

Corp. from 1938 to 1942. He went to J&L in 1935 as manager of sales, tubular products from the Timken Steel & Tube Co., where he had been manager of tube sales since 1932. **F. E. Elge**, founder of Trent Tube Mfg. Co., has resigned as president to become executive vice-president. He will continue as director.

• **Robert L. Miller**, former assistant sales manager of the roads machinery division of the Heil Co., Milwaukee, has been appointed district sales manager for the firm with headquarters at Kansas City.

• **Moxie S. George** has been appointed district sales manager of the New York office of Inland Steel Co. Mr. George is being transferred to New York City from the Chicago office, where he has been assistant manager of sales in the tin plate and export division since 1938. He began with Inland as a salesman in the Milwaukee district sales office in 1924 and 2 years later was appointed assistant district sales manager at Milwaukee. Mr. George succeeds **Powell Pardee**, who will continue to serve in the New York office as special representative.

• **J. J. Hessler** has been appointed contracting manager in charge of American Bridge Co.'s Pittsburgh district office. He succeeds **George E. Poucher**, who has retired after 45 years with the company. **James A. Richardson** has been appointed assistant contracting manager in the Pittsburgh district office. Mr. Hessler began with American Bridge as a draftsman at Ambridge in 1929. He was transferred to the designing and estimating department in 1937, and to the contracting department in 1945. During the war he was a cost estimator in the company's shipbuilding program at Ambridge. Mr. Poucher had been in charge of the Pittsburgh district contracting office for 16 years. He began working for the company in 1902 as a draftsman at East Berlin, Conn. Mr. Richardson began with American Bridge in 1937 as a machine hand. He served in the Army from 1942 until last year. Since his return from military service, he has been a contracting engineer in the company's Chicago district office.



WALTER H. WIEWEL, president, Trent Tube Mfg. Co.

• **Walter H. Wiewel** has been elected president of the Trent Tube Mfg. Co., East Troy, Wis. Mr. Wiewel has resigned as assistant to the president of National Tube Co., a U. S. Steel Corp. subsidiary in Pittsburgh, to accept his new post, where he will direct the manufacture and sale of its line of stainless steel tubing. He has been with National Tube since 1944. Prior to that, he served for 2 years with the War Production Board Steel Div., where he held the positions of vice-chairman of the Production Directive Committee and chief of the Tubing Branch. Before going with WPB, Mr. Wiewel was assistant general manager of sales for Jones & Laughlin Steel

PERSONALS

• **John C. V. Pyle** has been appointed president of American Machine & Metals, Inc., East Moline, Ill. Mr. Pyle will succeed P. G. Mumford, who will continue as board chairman. **Charles W. Anderson** will replace Mr. Pyle as executive vice-president of the company. **P. S. Mumford** has also been appointed vice-president.

• **William E. Osband** has been named manager of the Great Lakes sales region of the Packard Motor Car Co., Detroit. He joined Packard in 1929 and has held important positions in both the field organization and the factory sales division. The Great Lakes sales region, with headquarters in Cleveland, includes the District of Columbia, all of Virginia, and parts of Ohio, New York, Pennsylvania, Maryland, West Virginia and North Carolina.

• **P. E. Lueders, K. S. Lueders, T. H. Lueders, A. J. Seiler, A. J. Betus, D. P. Beaver and J. M. Baxter** have been elected directors of the Phosphor Bronze Smelting Co., Philadelphia. The following officers were elected: **P. E. Lueders**, president; **A. J. Seiler**, executive vice-president; **K. S. Lueders**, vice-president; **J. M. Baxter**, treasurer; and **H. S. Thrasher**, secretary.

• **Barney N. Dagan** has been appointed assistant openhearth superintendent of the Fontana, Calif. steel mill of Kaiser Co., Inc., replacing C. W. Conn, who had resigned recently to accept a position with the Ford Motor Co. Mr. Dagan was formerly assistant to the openhearth superintendent. Previous to joining the Kaiser Co., Inc., Iron & Steel Div., he was associated with the Youngstown Sheet & Tube Co. **Clarence R. Lohrey** has been appointed assistant superintendent of the coke and byproducts department. Mr. Lohrey was formerly coke plant superintendent at Republic Steel Corp., Cleveland.

• **C. L. Hewitt, Jr.**, one-time eastern sales manager for the L. J. Mueller Furnace Co., Milwaukee, has returned to the company to become general sales manager.



W. J. EBERLEIN, vice-president in charge of sales, Greenfield Tap & Die Corp.

• **W. J. Eberlein**, general sales manager, has been elected a vice-president in charge of sales of the Greenfield Tap & Die Corp., Greenfield, Mass. Mr. Eberlein has been connected with the corporation for over 30 years, starting as a clerk in the sales department, progressing from there to field engineer and then Detroit district sales manager. In 1941, he returned to Greenfield as assistant to the sales manager and in 1943 was made sales manager.

• **Felix E. Wormser** has resigned as secretary and treasurer of the Lead Industries Assn. to accept

FELIX E. WORMSER, assistant to the president, St. Joseph Lead Co.



an appointment as assistant to the president of the St. Joseph Lead Co., New York, on May 12.

• **Alfred Iddles**, who has been associated with the Babcock & Wilcox Co., New York, since 1937 and a vice-president since 1945, has been elected a director of the company.

• **Ernest E. Olds** has been appointed general sales manager of Size Control Co., division of American Gage & Machine Co., Chicago.

• **Herman H. Frahme**, who resigned as plant superintendent and plant manager of Chemical Equipment Div., General Ceramics & Steatite Corp., to become vice-president of Northwestern Terra Cotta Corp., will serve U. S. Stoneware Co., Akron, Ohio, as consulting ceramic engineer.

• **M. J. Van Dreser** has been appointed southern district sales manager for the Alloy Rods Co. with his headquarters in Dallas.

• **A. C. Breitenbeck** has been named factory manager of Kaiser-Frazer Detroit Engine Div., recently leased from Continental Motors. Mr. Breitenbeck comes to Kaiser-Frazer from the Rumsey Mfg. Co., Seneca Falls, N. Y., where he has been works manager. During the war he worked at the Chrysler Tank Arsenal under E. J. Hunt, production manager at K-F Detroit Engine Div. **F. W. Sooneas**, associated with Chrysler Corp. for the past 12 years and recently assistant plant manager of the Lynch Road gear and axle plant, has been named plant engineer. **William McGuire**, formerly associated with Continental Motors, has been named general superintendent of the assembly and test division. Other appointments include **N. J. Blake**, master mechanic; **L. F. Harrison**, general superintendent, machine division; **F. V. Kline**, general superintendent, afternoon shift; **S. Summerlee**, chief inspector, and **A. G. Hazen**, superintendent, materials division. Messrs. Blake, Harrison, Kline, Summerlee and Hazen were transferred from the Willow Run factory.

PERSONALS

• **Edwin E. Potter** has been elected vice-president in charge of the commercial aspects of General Electric Co.'s relations with customers, succeeding vice-president Earl O. Shreve, who continues as a member of the president's staff with special duties as assigned. Mr. Potter's headquarters will be at New York.

• **John R. H. Truelsen** has been appointed abrasive engineer for the Milwaukee area by Norton Co., Worcester, Mass. **Richard H. Merchant** has been named field engineer in the Detroit district for Norton Co.

• **Frank H. Wickhorst**, former football coach at the University of California and head of the Navy preflight training program there during the war, has been appointed director of personnel procurement and training for the Henry J. Kaiser Co. with headquarters in Oakland, Calif. In his new position, Mr. Wickhorst will work with the various Kaiser companies to integrate their personnel procurement and training program.

• **Glenn W. Green** has been appointed Chicago sales representative for the Columbia Chemical Div. of Pittsburgh Plate Glass Co., Pittsburgh. Prior to the war, Mr. Green was laboratory superintendent for the Duquesne Light Co.

• **James H. Lassiter**, formerly of the Victor Gasket & Mfg. Co., has been appointed general manager of the Hurst Industries of San Jose, Calif.

• **Samuel N. Pickard**, president of the National Manufacturers Bank of Neenah, Wis., has been elected a director of Four Wheel Drive Auto Co., Clintonville, Wis.

• **John S. Seltzer**, recently with the Coil Engineering & Mfg. Co. of Roanoke, Ind., has joined the Lintern Corp. of Berea, Ohio, as general manager in charge of purchases, material control, and production. Mr. Seltzer was previously manager of purchases and stores for the Westinghouse Electric Corp. at its Cleveland plant, having been connected with that company for 23 years.



JOSEPH W. HARVEY, general sales manager, Vulcan Mold & Iron Co.

• **Joseph W. Harvey** has been appointed general sales manager of Vulcan Mold & Iron Co., Latrobe, Pa. He has been with the sales department of Vulcan since 1924.

• **John A. Sloan**, formerly district manager of the Des Moines, Iowa branch of Mack-International Motor Truck Corp., will now serve in the same capacity at Mack's Chicago branch. **A. L. Monck**, formerly of Mack's St. Louis branch, has been named district manager in charge of the company's Des Moines branch, succeeding Mr. Sloan.

• **Walter N. Westland** has been appointed eastern regional manager and **George W. Stevens**, mid-continent region manager of the Cummins Engine Co., Inc., Columbus, Ind. Mr. Westland has been general sales manager of the Marion Power Shovel Co. for the last 3 years. As manager of the Cummins eastern region, his headquarters is at New York, and his territory includes New York, New Jersey, Pennsylvania, Maryland and the five New England States. Mr. Stevens, as manager of the mid-continent region of the Cummins Engine Co., has headquarters at Fort Worth, Tex. His territory covers the states of Texas, Oklahoma and Louisiana. Mr. Stevens formerly held the position of district manager of the National Supply Co., Superior Engine Div., in charge of oil field equipment sales in the mid-continent area.

• **Allen W. Jacobson** has been appointed factory general superintendent for Boeing Aircraft Co., Seattle. Mr. Jacobson continued until Apr. 1 as manager of Boeing's experimental shops. In his new position he succeeds C. M. Weaver, who has resigned.

• **C. E. Wolliever** has been appointed director of personnel for all A. O. Smith Corp. operations and will make his headquarters at Milwaukee.

• **William P. Barrett** has been appointed representative for the General Electric Co.'s conduit products division in Cleveland. He came to General Electric in Bridgeport, Conn., in 1943 after 15 years with the John R. Woodhull Co. He has been connected with conduit products sales since 1944. **G. J. Brenner** has been appointed representative of the tungar and metallic rectifier division in the northwest, Seattle. Mr. Brenner, who has been in the Bridgeport office of the rectifier division, joined GE after 38 months in the submarine service during the war. **George W. Scully** has been appointed wire and cable representative in the General Electric Co.'s Atlantic district. He joined the electronics department in 1940. After 2 years' service in the U. S. Army, he was made assistant foreman in the radio division at Bridgeport, and joined the wire and cable division in 1944.

OBITUARY...

• **William A. Rayment**, 77, president of the New England Brass Co., Taunton, Mass., died recently. He formed the company in 1916.

• **Herbert L. Grapp**, 52, president of Despatch Oven Co., Minneapolis, died Mar. 22.

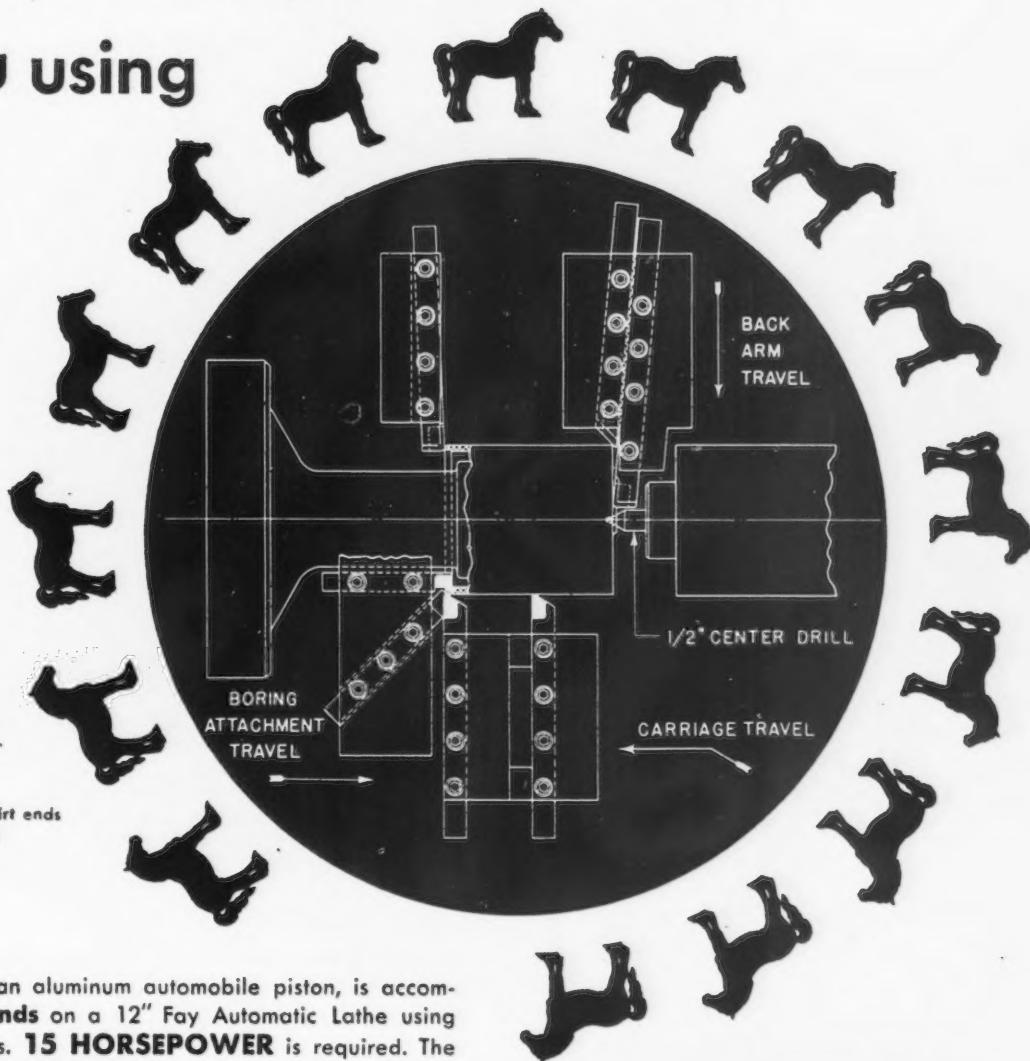
• **William G. Bott, Sr.**, 69, president of Aetna Platings Works, Chicago, died of a heart attack recently.

• **S. Frederick Kemper**, president of the Cincinnati Die Casting Co., Cincinnati, died recently.

How much HORSEPOWER are You using

?

1st. Operation on
an Aluminum Auto-
mobile Piston—
Rough turn O.D.
Face head and skirt ends
Center closed end
Rough bore skirt
Finish bore skirt
Chamfer skirt



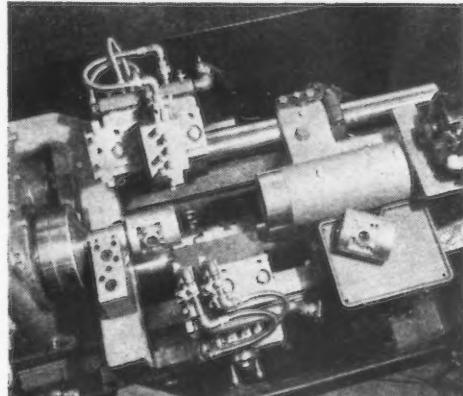
This operation, on an aluminum automobile piston, is accomplished **in 15 seconds** on a 12" Fay Automatic Lathe using carbide cutting tools. **15 HORSEPOWER** is required. The surface speed used is **1250 FPM**.

Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Be skeptical of the production efficiency of your metal turning equipment. The chances are that turning accounts for 25 per cent or more of all machining time in your plant—that this is your major production expense.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the efficient use of carbide cutting tools on Jones & Lamson machines. Our Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of these tools.

Send for our folder "Machining Automotive Pistons". Or better yet, telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Manufacturer of

Fay Automatic Lathes

and Universal Turret Lathes •

Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies

Industrial News Summary...

- Steel Labor Outlook Darkens
- Coal Shutdown May Be Serious
- Additional Extra Changes on the Way

AS IF the steel industry didn't have enough trouble this week with its coal mines abruptly shut down over a mine union-government safety squabble, its attention was forcibly focused on the steel labor outlook which is turning darker every day. Contract extensions run out the end of this month and it is not expected that Philip Murray, steelworkers union head, will again postpone the issues.

A real crisis in steel labor relations—more serious than any since early 1946—will be reached around the middle of this month. At that time Mr. Murray will report to his policy committee on the results obtained so far in collective bargaining meetings with the U. S. Steel Corp. The report will be brief and can be summed up in one word—nothing.

Meetings between the union and the Steel Corp. have led up blind alleys because the steel firm insisted that no basic wage talks were of any value until the portal pay question was legislated out of the way. The current portal bill in Congress has apparently satisfied no one except its sponsors and current reports say that President Truman will veto the bill.

A veto without the substitution almost immediately of an acceptable portal pay bill which would eliminate the danger of long retroactive pay adjustments will find the steel union close to the end of its contract extension and in a position where some policy decision must be made in an attempt to put heat on the steel industry for wage increase action.

CORDIAL relations between steel firms and the union are now in the synthetic stage with both sides aware that some definite action must be taken within a week to 10 days if the steel labor outlook is to remain on an even keel. There is little chance that the Steel Corp. will budge from the position that no definite wage negotiations can lead anywhere until retroactive portal pay possibilities are eliminated by law.

It now looks as if the failure of Congress to act promptly many weeks ago on the specific question of the portal pay issue will place on it the responsibility for a steel strike if one occurs—and this week such a possibility is not too remote. Mr. Murray and his policy committee will decide that question by the middle of this month.

Despite the hullabaloo about cutting or not cutting base steel prices, the possibility of a basic price reduction, if labor does not demand too high a wage increase, is not ruled out. If the steel union should agree to a very moderate wage increase it is quite probable that the major steel producer would follow through with at least a token cut in steel base prices. But until negotiations are completed and a wage increase agreed upon, there will be no consideration given by steel companies to the question of base price cuts.

The reduction in extras (which are only part of the total delivered price of steel and are a somewhat smaller proportion of total delivered prices than are base prices) already made represents a saving of more than \$15 million a year to steel users. Other changes are being planned this week which will result in a reduction in the extra charges for certain wire products. The savings in this category could easily run as high as an additional \$5 million a year to consumers.

OTHER extra changes definitely in the picture involve pipe and tubular products and may be announced within the next 30 days. They too will represent moderate savings to the steel consumer. These changes are separate and apart from any possible cuts in the base price of steel which might or might not be made after wage agreements have been signed.

Despite the coal mine outlook, steel ingot production is down only one half a point to 95.5 pct of rated capacity. If the coal controversy is cleared up within the next 10 days no substantial drop in raw steel output will occur. If the shutdown takes a more serious turn a week from now steel firms will be forced to make sharp cuts in their schedules to conserve stocks of coal on hand.

Price weakness again swept through steel scrap markets this week. Declines included 50¢ a ton at Pittsburgh, \$2.50 a ton at Chicago and an average of \$2.75 a ton at Philadelphia and Detroit. THE IRON AGE steel scrap composite this week declined to \$35.42, a drop of \$1.91 a gross ton from last week's figure of \$37.33.

AN IRON AGE tabulation of the 1946 earnings reports of 22 companies, representing 88 pct of the steelmaking capacity of the United States, shows a 49 pct gain in earnings over 1945. This was accomplished despite a 19 pct decline in net sales and operating revenues. Strikes early last year seriously interfered with earnings, requiring transfers from contingency reserves in many cases. These transfers, combined with excellent operations during the last half of the year were almost entirely responsible for the bright 1946 income picture.

Other factors not to be overlooked in comparing income results for the 2 years were the abolition of the excess profits tax and reduction of income taxes for 1946. In addition, many steel companies charged off emergency war facilities in 1945, making that year's results look comparatively poorer. Study of the 1946 income picture leads many observers to predict that if the strike-clouded air clears, earnings in the first half of 1947 will be excellent.

• **MASS PRODUCTION**—Pullman-Standard Car Mfg. Co.'s plant at Michigan City, Ind., has more than doubled their 1946 average production rate of freight cars. The plant is now building 39 cars daily and has the facilities to reach a rate of one new completed freight car every 10 min of a working day as soon as the steel mills begin to ship the tonnages agreed on recently in Washington.

• **AUTO REGISTRATIONS**—With 42 states reporting for January, new passenger car registrations totaled 156,261 units, according to R. L. Polk & Co., statisticians for the automotive industry. Figures on new truck registrations for 43 states for January show 51,403 new vehicles were registered during the month. The largest number of new truck registrations reported was for models of 5000 lb or less, with the 10,000 to 14,000 lb weight classification running a close second. Preliminary figures for February indicate new passenger car sales may increase slightly during the month, while truck registrations are expected to hold at about the January level, Polk officials said.

• **ALLOY STRIP PRICES DOWN**—Makers of hot-rolled strip have eliminated the 8.2 pct OPA-allowed boost made last year. This increase was billed as a separate item and added to the base price of \$4.70 per 100 lb. This latter price continues to be the new base price in the latest revisions. Extras on hot-rolled alloy strip have been completely revised and reflect a proper balance between the various charges.

• **EMPLOYMENT TRENDS**—Employment in the iron and steel, nonferrous metals, and automotive industries increased by about 1 pct in February, according to the U. S. Employment Service. Gains in employment were registered for all manufacturing industries but a seasonal decline was registered for the construction industry. Total employment for the nation as a whole rose to 55,500,000 in February, with construction as the only major category to show a marked decline—about 110,000 for the month. A rise in labor demand for not only construction but heavy goods and their trade outlets was forecast for coming months.

• **REPUBLIC RECORD**—Shipments of finished and semifinished steel from plants of Republic Steel Corp., the company says, reached an all-time high during March, totaling approximately 580,000 net tons, breaking the previous record of 541,884 net tons shipped in March 1941. Republic officials said the record shipments will make a measurable reduction in the huge backlog of orders which Republic has on its books. Two of Republic's 21 blast furnaces set new iron making records, both of these exceeding 45,000 tons, a figure never before achieved by any of the corporation's blast furnaces.

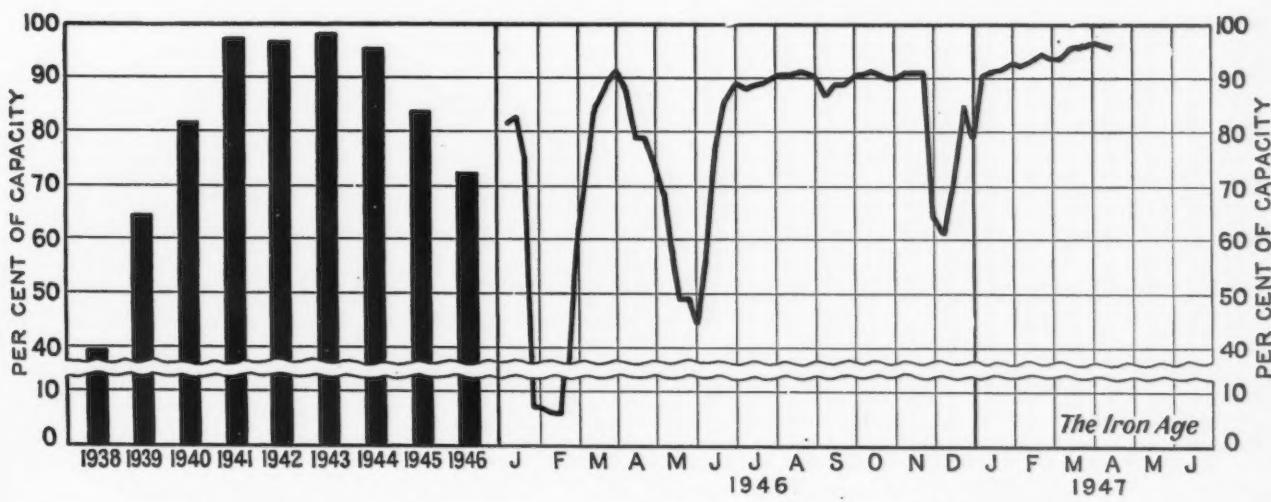
• **STEEL CASTINGS OUTPUT**—Shipments of steel castings during January 1947 amounted to 148,000 short tons, an increase of 21 pct over the 122,000 tons shipped during December 1946, according to the Bureau of Census. Carbon steel castings accounted for 114,000 tons during January or 77 pct of the total, and alloy steel castings for 34,000 or 23 pct of the total.

• **TOTAL INCOME UP**—Income payments to U. S. individuals during the month of January climbed to \$14,442 million, up 10 pct over the same month of 1946, according to the Dept. of Commerce. On an annual basis these payments are equivalent to \$176 billion. In 1946, income payments to individuals totaled \$163.7 billion.

• **GRAY IRON CASTINGS**—Shipments of gray iron castings, including soil and pressure pipe, during January 1947 amounted to 1,056,000 short tons, an increase of 19 pct over the 889,000 tons shipped during the previous month, according to the Bureau of Census. The January shipments were higher than at any time since the report was instituted in January 1943, the Dept. of Commerce said.

• **EXPORTS SOAR**—Value of U. S. exports rose \$37 million in February to \$1,153,000,000, the highest dollar value of any month since the \$1,187,000,000 figure reported for November 1944. Some 76 pct of the 1944 figure, however, was represented by lend-lease shipments. For February 1947, the lend-lease shipments had dropped to \$3.5 million.

Steel Ingot Production by Districts and Per Cent of Capacity



Signs of the Times -



N-A-X HIGH-TENSILE is synonymous with SAE 950 steel. It meets the requirements of this new SAE standard for low-alloy, high-tensile steel. It provides exceptional physical properties, proved in a wide range of applications—high strength, good formability, excellent weldability, high fatigue-resistance and impact toughness, greater corrosion-resistance. It incorporates the benefits of Great Lakes Steel Corporation's long experience in producing a low-alloy steel to meet severe fabricating and service conditions. N-A-X HIGH-TENSILE is SAE 950 at its best.

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UNIT OF NATIONAL STEEL CORPORATION

MAKE A TON OF SHEET STEEL
GO FARTHER
Specify—



Steel Labor Picture Rapidly Turns Dark and Gloomy

New York

••• The steel labor picture is rapidly turning dark and gloomy. Contract extensions will run out the end of this month and the way the wind blows now there may be no more postponements.

The real crisis will be reached around the middle of this month when Philip Murray, USWA head, talks to the union's policy committee. They will get the latest report on steel negotiations so far.

Mr. Murray will have little trouble telling the group how much has been accomplished. He can tell them in one word—nothing. Unless some move comes from the U. S. Steel Corp. which changes the outlook, the USWA may have some important things to say, according to sources close to the union.

Relations have been cordial between the union and the Steel Corp. but by last week it was hinted that cheeks were becoming tired from forced courtesy smiles. Steel companies have taken the stand that nothing on wages can be decided until the danger of portal-to-portal retroactive wage payments is eliminated. The union, not wishing to appear bellicose in February when the heat was on in Congress, agreed to what it thought was a long extension; which also gave it the chance to see first quarter steel earnings reports.

The dilly-dallying in Congress on the portal question has produced a bill which both sides believe Mr. Truman will veto. Industry had hoped that Congress would quickly pass a portal bill so that wage negotiations could be completed. Instead, the solution of the portal pay problem is only a small part of current proposed legislation and it has taken weeks to get that far.

The steel company side of the problem is that no wage increases can be granted and no fringe demands allowed until the industry is sure it will not be billed for back wages. There is little chance that the Steel Corp. or other steel firms will budge from this position—which means even a strike will not change their mind. It

Crisis on Wage Negotiations To Be Reached Around The Middle of April

By TOM CAMPBELL
News-Markets Editor

looks now as if the failure of Congressmen to act promptly on the portal question will place on them the responsibility for a steel strike if one occurs—and this week such a possibility was not too remote.

Some steel officials are privately alarmed at the complacency of some of their own group. They argue that to sit back and take it easy on the basis that Congress will crack down if labor calls

strikes is shortsighted. Yet these same sources admit that no progress can be made until the spectre of law suits and back pay from the portal decision are removed as a nightmare threat.

The union feels by now that it has had a grand runaround. According to reliable sources, unless something happens soon to change this attitude, the policy committee by the middle of this month will be making definite strike plan strategy. They will take such action, it is said, because they believe that nothing is to be gained by sitting around literally playing mumbly peg. To make matters worse, the union believes that obstacles are being put in their way on noneconomic aspects of a new contract. They also feel that valuable time has been wasted talking about wage conditions and ability to pay when

"Is there a fusecutter in the house?"



everyone at the conference table knows some are stifling yawns.

It is a good bet that had the portal question not come up the Steel Corp. could have wound up its negotiations with the union in short order. It was in a good position to do so, especially after the price increases of last December and of January this year.

Part of that increase was probably earmarked to take care of whatever wage demands would have to be granted and some steel officials played around in their minds with a figure of 11¢ an hr long before the rubber contract was settled.

All this "if and as how" figuring does not help the current sit-

uation which is rapidly taking an ugly turn—and neither the steel firms nor the union will take the responsibility for the change in the picture. Congress must take a large share, and before the thing is settled government may again be involved—a factor which both sides had hoped was completely out.

See Mine Shutdown Causing Little Immediate Loss of Steel

New York

• • • The shutdown of coal mines over the question of alleged safety hazards will not affect the steel ingot rate for the country this week and if the shutdowns continue into next week, the decline still will not be too great. If indications point to a long tieup of the coal mines serving the steel industry, many steel firms will be forced within 10 days to drastically cut operating rates in order to conserve coal supplies on hand.

A long mine shutdown would hit the industry where it can least stand it—at the blast furnaces where pig iron output had been on the increase. Lack of fuel in case of an extended shutdown would force out of production a substantial number of blast furnaces with the result that scrap demand would be heavier and total steel ingot output somewhat affected.

There was no indication this week as to how fast coal mines owned and operated by steel companies would be put back into production following a safety certification by governmental authorities. There was evidence that the miners would stay away from the pits in line with John L. Lewis' order to district mine leaders that they had no authority to certify the safety conditions of the mines.

According to opinion in coal operator quarters, Mr. Lewis has been able through the use of the "memorial strike" and the "safety strike" to obtain the same result which the U. S. Supreme Court had ruled against—an almost complete shutdown of coal mines.

When the present controversy is settled some observers feel that the Illinois mine disaster may

But if Long Tieup Appears Due Mills Will Make Drastic Cuts Within 10 Days

bring the southern operators closer to the northern group which is willing to concede the union's right to a welfare fund. So far, reports that the mine operators and the UMW would be able to reach an agreement before June 30 when the mines are returned to the operators are more in the realm of speculation than actual probability.

Recent tactics of Mr. Lewis have embittered many coal operators but this does not necessarily mean that a subsequent agreement cannot be made. The

main stumbling block to an early settlement between the UMW and the operators is the refusal of the southern operators to agree to a miners' welfare fund.

Steel officials believe that the immediate future indicates a rough road ahead on the coal contract question with the probability that steel production may be affected slightly between now and the making of a coal pact. Until the captive mines of the U. S. Steel Corp. are back into production that company's Pittsburgh plants will lose steel output because of beehive coke shortage.

About 15 pct of the steel corporation's Pittsburgh steel capacity is dependent upon blast furnaces supplied by beehive coke instead of byproduct coke. When the mines are down so are the beehive coke ovens.

Whether or not the coal mine fracas will force a reversal in the trend of scrap prices remains to be seen. There was no indication of a strengthening in scrap prices early this week. In fact, the contrary was the case.

Washington

• • • On Apr. 3 some 518 of the 2531 soft coal mines under federal control were ordered by Interior Secretary J. A. Krug to remain temporarily closed for safety reasons. Capt. N. H. Collison, Coal Mines Administrator, requested John L. Lewis, president of the United Mine Workers, to submit for consideration the names of any other mines which the union considers so hazardous as to require closing until similar steps are taken as in the case of the mines ordered to remain closed.

In the case of the 2013 mines allowed to reopen, Secretary Krug

Coal Stocks At Byproduct Coke Plants*

(Thousand of net tons)

Source: U. S. Bureau of Mines

Month	Tons	Days' Supply
January, 1946	5661	33
February	6393	48
March	8269	—
April	4117	—
May	2565	—
June	3630	17
July	3871	16
August	5230	21
September	5924	23
October	6593	26
November	6355	27
December	5222	24
January, 1947	5885	23

* Most byproduct coke plants are operated by steel companies, the coke being used in pig iron production. When coke plants are shut down, steel output is seriously affected.

said, a review of inspection reports failed to indicate unduly hazardous conditions.

On Apr. 5 John L. Lewis asked Secretary Krug to close all but two of the 2531 federally operated mines. Mr. Krug's refusal to comply with the Lewis request was interpreted by most miners as a signal to stay out on Monday, Apr. 7, when the "memorial strike" was to have ended. As expected, many of them did, and soft coal production was estimated at about 31 pct of normal on Monday of this week.

Pittsburgh

• • • Some observers believe that before the government turns the coal mines back to the operators on June 30, 1947, the United Mine Workers and the operators will have come to some agreement on a contract. This is the thinking of people directly involved in mine contract matters, including Adm. Ben Moreell, who until recently was Coal Mines Administrator for the government. Others feel that this paints too optimistic a picture and that a contract deadlock may result, with the government called in to arbitrate.

With steel production close to peacetime highs, the industry's coal consumption is also at near record levels. The U. S. Bureau of Mines reports that January coal stocks for steel mill operating needs (i.e. for use other than actual steelmaking) were 878,000 net tons and that byproduct coke plant reserves were 5,885,000 net tons.

This amount would appear to put the mills in a comfortable position, but despite the heavy tonnages their stocks are none too good at present operating rates. Compared with figures for previous months, as far back as January 1944, the tonnages are high but the daily consumption of coal, both for general mill operation and for byproduct coke plants, is likewise high. On the basis of present consumption, and before calculating the effect of the shutdown of unsafe coal mines, the mills had an average coal stock of 29 days for operating purposes. Byproduct coke plants' coal stocks would last an average of 23 days.

Because of the importance to steelmaking of byproduct coke plants, the latter is considered the determining factor. In evaluating the 23-day stock observers are



concerned with the length of time it will take to correct those conditions in captive mines which caused the government to shut them down. If the relatively few steel mill mines affected can be

corrected to the satisfaction of Federal mine inspectors within a week or so, the net effect of the "memorial strike" and the "safety shutdown" will be relatively slight on the steel industry as a whole.

Report Record January Sheet, Strip Shipments

New York

• • • Shipments of finished steel in January shows that the total amount of hot and cold-rolled sheet and strip shipped by the steel industry was 1,460,389 tons, equivalent to an annual rate of 17,190,000 net tons, according to the American Iron & Steel Institute.

The total amount of finished steel of all types shipped by the steel industry during January was 5,030,000 net tons.

January shipments of hot and cold rolled sheet and strip represented 29 pct of all the finished steel shipped during that month. This means that the flat-rolled products comprised as large a ratio of total steel shipped as the 1946 average which topped every year since 1940. In 1940, this ratio was 27 pct, and in 1941 it was 26 pct.

In January, hot-rolled sheet and strip shipments were 50.6 pct of total shipments of hot and cold-rolled sheets and strip. This compares with an average of 48.7 pct for the entire year 1946.

Republic Steel's 1946 Income Was \$16 Million, Final Report Shows

Cleveland

• • • Net income of Republic Steel Corp. for 1946 was \$16,033,469 after all charges and taxes, according to T. M. Girdler, chairman, and C. M. White, president, in their annual report to Republic stockholders.

Gross sales and operating revenue for 1946 was \$415,749,805, a decrease of approximately \$85,000,000, as compared with 1945. Net income for 1946 was at the rate of \$2.53 per share of common stock and for 1945 at the rate of \$1.36 per share of common stock.

Operations for 1946 averaged 70.3 pct of capacity, with ingot production at 6,260,047 tons, compared with 7,545,825 tons for 1945.

Republic's funded debt was reduced by \$7,810,000 to \$61,440,000, the lowest in 12 years.

With the completion of the South Chicago steel plant purchase, Republic will own the modern war built steel plant consisting of an ore dock, a byproduct coke plant, a blast furnace, four tilting openhearth furnaces, 9 electric furnaces of which 6 are installed, a 44-in. blooming mill, and a 36-32-in. bar mill, together with complete service facilities.

Capital expenditures for new improvements during the year totaled \$20,998,647. Improvements were made in mining, steel-making, manufacturing and warehousing properties.

A NEW ONE: Latest arrival in the American light car class is the Playboy, a convertible rear-engined style car slated for volume production in 1948. Price: about \$950.



120—THE IRON AGE, April 10, 1947

Mr. Girdler and Mr. White pointed out that one of the great problems of 1946 was the task of meeting demands for steel on the part of customers.

"We have, however," they said, "held to our rule of supplying the customers on our books in 1939 and 1940 in order to maintain an equitable distribution of our steel and iron products."

Playboy, New Light Car Will Bow to Public In New York This Week

Buffalo

• • • A new light car priced at about \$950 will have its first New York showing this week. The Playboy Motor Car Mfg. Co., Buffalo, announced a 4-day exhibit of its Playboy car at the Hotel Pennsylvania beginning April 12.

The Playboy will have rear-engine drive, full 4-wheel independent suspension, an "automatic drive" and no clutch pedal. It is a convertible style car 13 ft in overall length and 54 in. high. Powered by a Continental L-head 4-cylinder water cooled motor, the car will have an all steel, all welded integral body and frame.

Features include under-seat heater and built-in radio aerial, 4-wheel hydraulic brakes and a 10-cu ft luggage compartment in the space under the hood.

Company officials state that the car going on display is a production model, and that 100,000 are scheduled for manufacture in 1948. Stamping of body and fenders has already started at the factory, 988 Ellicott St., Buffalo.

Sharon Merges Detroit Seamless, Bopp Steel As a New Subsidiary

Detroit

• • • Merger of Detroit Seamless Steel Tubes Co. and Bopp Steel Corp. to form the Detroit Tube and Steel Co. has been announced by Sharon Steel Corp. Henry A. Roemer, Jr., will be president of the new firm which will function as a wholly-owned subsidiary of Sharon Steel Corp.

Other officers include: A. J. Bopp, chairman of the board; H. L. Maher, vice-president; J. H. Dunbar, vice-president; J. J.



Kraus, vice-president; F. R. Taylor, secretary-treasurer; A. G. Erickson, assistant secretary-treasurer.

The new operation puts Sharon actively in the Detroit market as a producer with an annual capacity of 100,000 tons of seamless tubing and cold-rolled strip, Mr. Roemer announced. Approximately 700 men are on the payroll of the new firm.

Other Sharon operations in Detroit will include a new steel warehouse, Sharonsteel Products Co., which will carry all the various types of steel produced by the parent company and its affiliates, including the Detroit plants, the Niles Rolling Mill Co., at Niles, Ohio, and the Brainard Steel Div. at Warren, Ohio.

Detroit Seamless Steel Tubes Co. was established in 1900 and Bopp Steel Corp. in 1930, while the principal outlet of their products is the automobile industry, large shipments are also made to railroads, the oil industry, household appliance producers and other steel users.

Poles Import Little Scrap

London

• • • During 1946 the Polish Scrap Iron Exchange collected 584,000 metric tons of scrap. Imports of scrap iron for the same year amounted to only 9600 metric tons.

Chesapeake & Ohio R.R. To Build New \$5 Million Low-Level Coal Pier

Cleveland

• • • Plans of the Chesapeake & Ohio Railway Co. to construct a new low-level coal pier costing an estimated \$5 million, which will increase by 33 1/3 pct the railroad's facilities for loading coal on ships, have been announced by Robert J. Bowman, C&O president.

Construction of the new pier and necessary supporting yard facilities at the Newport News terminus, where the C&O now has two piers with a total of three dumpers and a combined capacity of 150,000 tons a month under favorable conditions, will serve as a reserve which will maintain loadings at near capacity while other facilities are under repair.

In the next 3 to 5 years it is expected that approximately 2 million tons of coal will be offered at Newport News piers each month, or 500,000 tons more per month than can now be handled, Mr. Bowman said.

It was estimated it will take 9 months to assemble steel for the new pier, and that the project will be completed in 15 months after construction starts.

The new pier will be similar to and located along the west side of pier 15, a reinforced concrete structure on concrete piling, and extending 1000 ft from the bulkhead into the James River. It is equipped with a single stationary dumper with rated capacity for dumping 50 cars per hr.

A loaded car is rolled by gravity onto the low-level pier, which is at the same level as the decks of loading vessels, and then is pushed upward to the dumper by a mechanical "mule." After the car is placed on the dumper, it is clamped in place, elevated and turned over to dump the coal into a pan from which it flows through a telescopic chute into the vessel taking the cargo.

The empty car then is kicked off the dumper by the next loaded car, rolls by gravity to a high "kickback" at the outshore end of the pier and thence by gravity to the yard for empty cars.

The new C&O pier will be similar in operation except cars will be fed from the yard to the

dumper by an electric pusher instead of by gravity.

A deep slip will be dredged alongside the new pier and the dredged material will be pumped onto the shore to provide fill for the new yard. Plans include a car-thawing plant, buildings and appurtenances.

Mr. Bowman also announced that directors had authorized the purchase of two 1000-hp tugboats, for which competitive bids will be asked. These boats, estimated to cost about \$450,000 each, will augment one 750-hp and three 1000-hp tugs now in service in Newport News and Hampton Roads.

Improvement Program Asked at Meeting Of Lake Carriers' Group

Cleveland

• • • A recommended program for continuing improvements that have raised the Great Lakes bulk cargo fleet to a capacity expected this season to prove capable of moving its largest peacetime tonnage was brought before shipping officials at the annual meeting here Apr. 3 of the Lake Carriers' Assn.

In addition to fostering the use of radar, as developed by the world's first experimental program for adapting it to commercial shipping—just concluded by the association—the agenda of the meeting included practices for safe handling of the heavy traffic in lake vessel routes, improved training of officers and welfare of the 12,000 men who man the fleet.

Stockholders of the Lake Carriers' Assn. met first to hear the committee reports on these subjects and to elect their board of directors for 1947.

Among the association's guests were Congressman A. F. Weichel of the Merchant Marine & Fisheries Committee; Congressman George H. Bender; Admiral Jos-

eph F. Farley, commandant of the U. S. Coast Guard; Admiral Ellis Reed-Hill; Commodore H. C. Shepheard, chairman of the Merchant Marine Safety Committee; Commodore E. M. Webster of the Federal Communications Commission, and Col. D. O. Elliott, division engineer in charge of the Great Lakes region, U. S. Army Engineers.

Canadian Ingot Output In February Stays High

Toronto

• • • Canadian production of steel ingots and castings in February totaled 229,222 net tons compared with 249,798 tons in January and 233,893 tons in February 1946. The decline for the month under review, however, was entirely due to the shorter month, as throughout February output maintained a daily average of 8187 net tons or 82.4 pct of rated capacity, against 8058 tons a day or 81.2 pct for January. Production in February included 223,124 tons of steel ingots and 6098 tons of steel castings.

For the month charges to steel furnaces included 119,797 tons of pig iron; 72,831 tons of scrap of consumers' own make and 52,794 tons of purchased scrap.

LARGE SPLASH: Too big and too heavy for either rail or barge shipment this 160-ton regenerator is being rolled into Newark Bay prior to a 2000-mile inland waterway trip. M. W. Kellogg Co. fabricated it at its Jersey City plant.



ODT Reports Steel Industry Okay on 10,000-Car Program

Washington

• • • Steel industry agreement to furnish 210,063 tons of steel a month to freight car builders during July and August was announced last week by the Office of Defense Transportation. The tonnage will be used to put into effect ODT's program calling for the production of 10,000 freight cars a month. While ODT hoped to have this increased tonnage scheduled fully for June rolling, the steel companies will gradually increase their output for freight cars from the approximately 165,000 tons a month now being provided for the production of 7000 cars a month until the maximum of 210,063 tons is reached in July.

This represents a 48-pct increase over the amount required for the 7000-car program now in full operation, according to ODT.

ODT, not completely satisfied with the amount the steel industry agreed to provide, has adopted a "wait and see" attitude. The government has receded from its original position that this increased tonnage would not be provided at the expense of other steel consumers. Other bottlenecks, primarily in pig iron, have still to be worked out, although car builders have expressed confidence that they will be solved if sufficient steel is provided.

The 210,063-ton figure represents a compromise on the part of ODT and the freight car builders. On the basis of information developed by the "industry committee" ODT sought approval of 171,000 tons for new cars and 68,000 tons for MRO, or a total of 239,000 tons.

The steel industry objected claiming there was duplication and inflation in the figures. Whereas the combined average tonnage per car on the basis of information developed by the car builders was approximately 17.1 tons per car, the steel industry committee insisted on a much lower figure but finally compromised on about 15.1 tons per car. On this basis they agreed to underwrite, says ODT, a total of approximately 151,000 tons for 10,000 new cars per month. They also reviewed the tonnages set up

Starting With July, Freight Car Shops Will Get About 210,000 Tons a Month

• • •

in January for MRO, which totaled approximately 63,000 tons at that time, and decided in the light of their experience with steel orders since January to underwrite approximately 59,000 tons for MRO. This results in a monthly total of 210,063 tons.

The steel companies assented to this increased program after it was realized that a 7000 car program was feasible and could be stepped up. The participating steel producers are the same as reported in THE IRON AGE, Mar. 6, p. 119.

The increased program carries only through August because the car builders' shipping schedules indicate a sharp decline after October from the 10,000-car level pending placement of additional orders in the car shops. Two months lead time was assumed between steel production and completion of cars.

The rolling schedules agreed upon were also part of the compromise. ODT had hoped that the steel industry would agree to increasing May rollings to the greatest extent possible and to have the increased rolling in full production in June. The steel committee rejected this request and decided that increased tonnages would be made available to the greatest extent possible for June rollings and the program would be placed in full effect during July.

ODT has told car builders and component and specialty producers that "each steel purchaser must make every effort, by contacting all of the listed suppliers if necessary, to place orders on a minimum basis in the month in which rolling is required in order to meet the car building schedules. The steel companies have been provided with the detailed requirements prepared by the car builders production committee,

and they will be in a better position to assess the actual requirements of each participant. By the same token, each participant should keep his request for steel down to minimum requirements so that the underwritten tonnages will produce maximum results in completed cars."

Pointing out that some difficulties in steel distribution may be expected, P. J. Treacy, Chief of CPA's Steel Branch, in a letter of March 31 to ODT Director J. Monroe Johnson, stated:

"It will be noted that there are some steel producers who do not normally sell to carbuilders or component parts manufacturers, and for this reason would presumably have no historical quotas with that industry. It should also be emphasized that there are certain producers on the list who may not be located advantageously with respect to the areas in which car building and the manufacture of car components are concentrated.

"However, it is expected that this tonnage can be utilized to some extent by the railroads for their maintenance and repair requirements, and we ask the full consideration of the car builders in purchasing from sources other than those which normally supply them or from areas which may involve in many cases additional freight costs, since it has not been possible to balance the geography of steel manufacture with that of car building and component car manufacture."

British Sell Nazi Ships

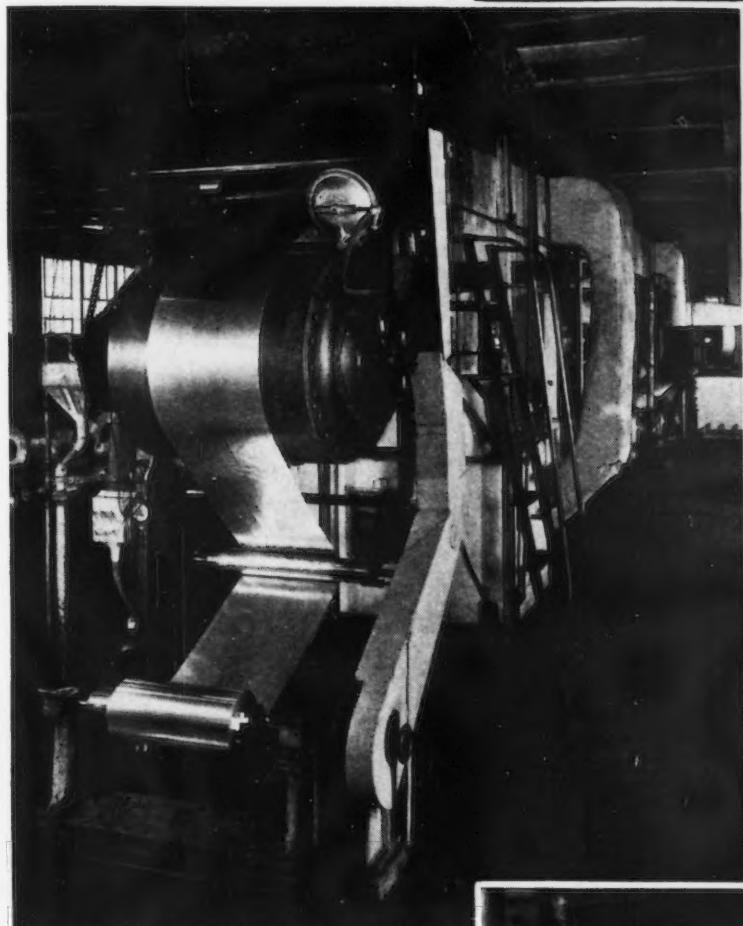
London

• • • The British Government has received \$14 million from the sale of 48 government-owned, ex-German ships. This was the third of a series of tenders for disposal by sale or charter. Out of the 59 ships originally offered, 49 were disposed of, one was withdrawn, and no acceptable offers were received in respect of the other nine. Only one ship was chartered.

The first tender early in 1946 realized \$78 million, with an additional annual charter hire of approximately \$4.3 million.

Aluminum Foil Rolling

Makers Doing Booming Business;
New High Speed Mill May
Cut Costs Further



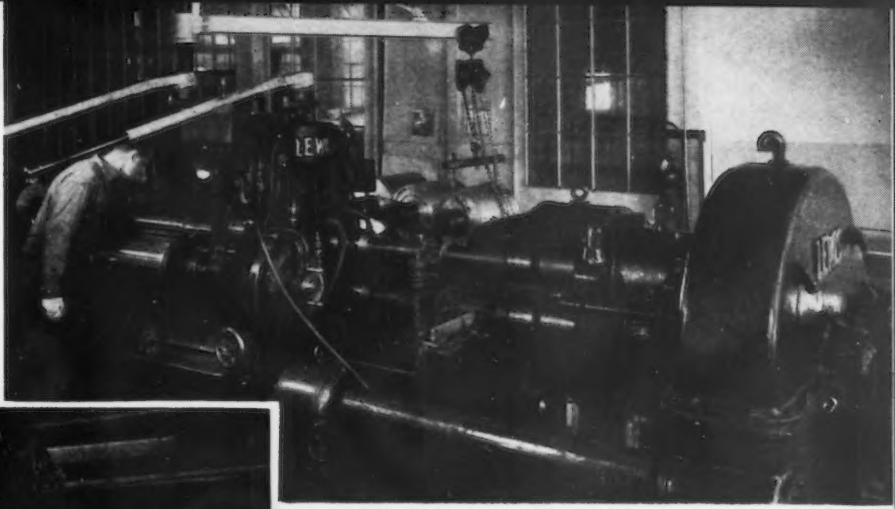
LEWIS foil mill, top, in operation at Crown Cork & Seal Co., Baltimore. At 100,000-lb roll pressure and speeds of 300 ft per min, aluminum strip, is reduced in three passes from 0.020 in. to foil of 0.0018 to 0.0020 in.

○ ○ ○

WALDION foil-coating machine, above, operating at 200 ft per min with a 15-sec heating period. Crown Cork & Seal Co. employs a thermoplastic cement which is applied by roller coating. Prior to coating, the foil is placed in a furnace at 900° F for 24 hr in order to burn off the oil.

○ ○ ○

A WALDION foil-slitting machine, right, operating in excess of 400 ft per min and slitting a 20 1/4-in. wide strip into 19 1-in. rolls. Flat spring steel is used for knives.



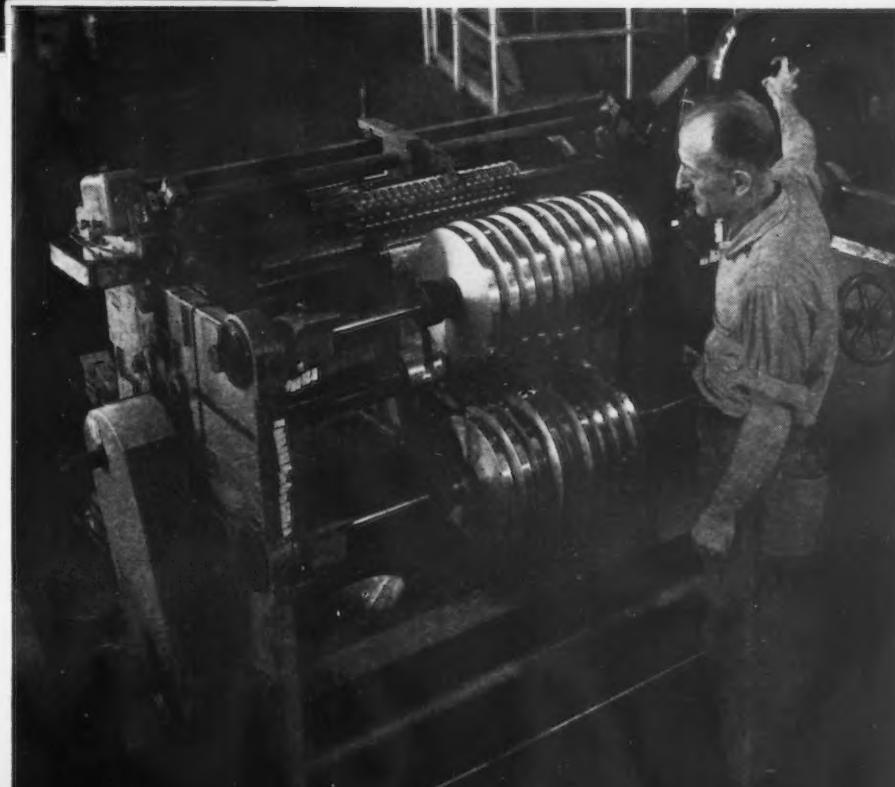
FOIL mill builders are now developing a high speed mill expected to produce foil at well over the current maximum rate of 1400 ft per min.

Foil costs, at such speeds, might well be brought down to the equivalent of paper.

Foil producers, as a rule, run a double thickness through the mill in order to bring down the final gage and increase mill output. Certain producers have rolled four-up at times, producing foil only 0.00025-in. thick. To prevent tearing of foil, tension on the let-off-rolls and wind-up rolls must be perfectly balanced. Otherwise rolling must stop to weld the ends of the foil together. When foil is rolled two or more up, a roll-splitting machine is required to separate it into individual rolls. Tension adjustment on the wind-up rolls is critical.

Foil gage is maintained by front and back roll tension. Producers apply all the tension that the foil will take without breaking. This may range from 50 to 75 pct of tensile strength. Work-roll pressures are tremendous. Deformation of the rolls to the extent of the foil gage plus the crown on the roll is common practice, for there is no gap between the rolls.

Foil is rolled cold but because of the roll pressures there is a temperature build-up to roughly 250° F. Rolls are commonly cooled internally. Mirror finish rolls of forged steel are required to impart the proper surface finish to the foil.



Transfers CPA's Authority Over Housing and Export Applications

Washington

• • • In the extension of limited authority to control specific materials under Title III of the Second War Powers Act until June 30 in CPA's functions have been virtually wiped out, except those relating to such things as tin, antimony, rated orders for export steel, and other materials for export. The agency's functions relating to housing were transferred to the Office of the Housing Expediter, effective Mar. 31. The regulations and orders transferred to OHE are PR 1, 3, 5, 7, 7A, 8, 22, 33, and 35; Veteran's Housing Program Orders 1, 3, 4, and 5, and Order L-357. Provisions of the priorities regulations which did not apply to housing were revoked on Mar. 31.

As a result, CPA has incorporated its limited powers in two new regulations—Allocations Regulations 1 and 2.

AR-1 incorporates in abbreviated form the basic "housekeeping" provisions of CPA's former priorities regulations, most of which have been transferred to OHE.

Among previous CPA requirements continued in AR-1 are those covering certifications on purchase orders and other documents; use of materials acquired with allocation assistance; inventory restrictions, records, audits and inspections, and violations. Included among the materials affected by these requirements are the following: Antimony, tin and tin products, natural and synthetic rubbers, and materials for export to meet specified needs.

Allocations Regulation 2 describes the limited scope of export preference assistance CPA will grant in the future, and sets forth in detail the circumstances and manner in which this assistance will be extended.

In general, issuance of authorizations to place certified orders will be limited to expediting purchase in this country of minimum quantities of scarce materials required to expand foreign sources of supplies badly needed in the

Retains Functions Relating To Tin, Antimony and Rated Steel Export Orders

• • •

United States, and to cases where the assistance is required to meet international commitments. Before granting assistance in these latter cases, CPA must receive a recommendation for approval from the Secretaries of State and Commerce.

Applications for CPA export preference certificates, for all destinations except Canada, will be addressed to the Office of International Trade, Dept. of Commerce. Applications for certificates to cover Canadian deliveries will go directly to CPA. In general, suppliers are required to accept and fill certified orders, giving them precedence over existing contracts and orders.

The regulation stipulates that the certificate on a certified order is equal in precedence to an RR (or CC) preference rating assigned by CPA prior to Apr. 1, or subsequently by the Housing Expediter.

Direction 1 to AR-2 explains how exporters who have been authorized by the Office of International Trade to use the symbol CXS on purchase orders for limited quantities of tinplate, should furnish that information to steel producers. It provides also that such orders are to be treated as certified export orders and that CPA may establish space reservations on steel producers' schedules for the benefit of these orders.

Direction 2 to AR-2 establishes special rules for placing, accepting and scheduling certified orders for steel, copper and aluminum. These rules provide lead time, between the placing of orders and their production, and provide that a producer of steel, copper or aluminum, in forms listed in the direction, need not accept a certified order which is received less than 30 days (45 days

in the case of tinplate) prior to the first day of the month in which shipment is requested, unless specifically directed to do so by CPA.

This direction applies to the following forms of steel, copper and aluminum: Carbon and alloy iron and steel (including stainless steel); bars, cold finished; bars, hot-rolled or forged; ingots, billets, blooms, slabs, die blocks, tube rounds, sheet and tin bar, and skelp; pipe, including threaded couplings of the type normally supplied on threaded pipe by pipe mills.

Also steel plates; rail and track accessories; sheet and strip; castings (rough as cast); structural shapes and piling; tinplate, terneplate and tin mill blackplate; tubing; wheels, tires and axles; wire rods, wire and wire products; forgings (rough as forged).

Also copper and copper base alloy products: Alloy sheet, strip and plate; alloy rods, bars and wire; alloy seamless tube and pipe; plate, sheet and strip; rods, bars and wire; tube and pipe; wire and cable; castings (before machining).

Also aluminum products: Rod and bar; wire (under $\frac{3}{8}$ "); cable (electrical transmission only); rivets; forgings and pressings (before machining); impact extrusions; castings; rolled structural shapes (angles, channels, zees, tees, etc.).

Also aluminum extruded shapes; sheet, strip and plate; slugs; foil; tubing; tube blooms; powder (including atomized, granular, flake, past and pigment); ingot, pig, billets, slabs, etc.

Inland Expects to Set New Production Record

Chicago

• • • Edward L. Ryerson, chairman, and Wilfred Sykes, president of the Inland Steel Co., in their annual report forecast that Inland expects to set a peacetime production record for 1947 if they can finish the year free of strikes.

Weekly Gallup Polls . . .

Truman's Greek Policy Winning Wide Public Support

Princeton, N. J.

• • • The first complete national survey of public opinion to aid to Greece shows that President Truman's program has substantial backing from the American people, according to George Gallup, director, American Institute of Public Opinion.

Their view is shown in the following vote among people who have heard or read about the issue of aid to Greece:

"Do you approve or disapprove of the bill asking for \$250 million to aid Greece?"

AID TO GREECE

	Pct
Yes	56
No	32
No opinion	12

On the proposed \$150 million aid to Turkey, the poll finds the following vote:

AID TO TURKEY

	Pct
Yes	49
No	36
No opinion	15

In short, aid to Greece is favored by nearly two-to-one and aid to Turkey by about one and a half-to-one at this stage of developments on the issue. Further debate and discussion may alter sentiment.

In probing opinion the institute covered many aspects of the issue, using a multiple-question technique. A comprehensive ballot was used in the interviewing of voters, their opinions being drawn out by a series of questions dealing with the Greek and Turkish problems.

Among the significant findings were the following:

(1) Truman's speech to Congress asking for \$400 million to help Greece and Turkey made a great impression on the American people. More than three out of every four so far say they have heard or read about his speech.

(2) While approving Truman's general policy, the majority express regret that the problem of Greece was not put up to the United Nations in the beginning.

Most voters recognize the reasons why the United Nations was bypassed, but they have faith in the UN and under ideal circumstances would have preferred the UN to handle the controversy.

(3) The majority of Americans are not afraid that the proposed stand in Greece and Turkey will lead to war.

On the contrary, the general feeling is that a strong stand which shows Russia that we are not bluffing will, in the long run, improve the chances of a European peace settlement.

The viewpoint of the majority is well expressed in the comments of a Philadelphia office manager, one of thousands of voters questioned in the poll. His statement sums up the typical attitude as follows:

"If we let Russia get away with her aggressive policy, she'll start reaching out for more and more and then we're bound to have a war on our hands. Dictators never know when to stop if you appease them.

"I think that putting our foot down now at the risk of war is more likely to bring lasting peace than giving in to the Russians."

(4) The people are being fairly hard-headed in their attitude toward money for Greece and Turkey. They're willing to see aid given, but they want American experts sent over to supervise the uses to which the money will be put.

The administration's plan to send such experts is approved by a vote of approximately eight-to-one.

(5) The country is anxious, however, to avoid military involvements of any kind in Greece.

Early this week Acting Secretary of State Dean Acheson told the Senate Foreign Relations Committee that the United States would send no troops to Greece.

(6) There is a very widespread feeling that the so-called "Truman doctrine" will have to apply to other nations if they get themselves in the same fix as Greece.

Veterans Who Fought to Bring About Peace Take Attitude Similar to Rest of the U. S.

• • •

In short, the public seems aware that our stepping into Greece may prove anything but an isolated incident, and that we might have to repeat the process in other nations where free government is considered threatened.

(7) The only major point on which the public does not seem to be clear is whether the governments of Greece and Turkey truly have the backing of a majority of voters in those countries.

More than half say they don't know whether the Turkish government is backed by the people and about four in every ten say they don't know whether the present Greek government has the support of a majority of Greeks.

Those Americans who venture an opinion are inclined to think the Grecian and Turkish governments are supported by a majority of citizens. But the poll clearly indicates that a very large section of the American public is looking to the State Dept. and other sources for more light on the question.

(8) Eighteen months after the ending of World War II the country continues to be anti-isolationist in its sentiments.

When asked whether we should take a strong stand in European affairs or try to get out of Europe, the voters indicate a two-to-one preference for a positive role across the Atlantic.

Following is a summary of the survey questions and answers in addition to those given in the beginning of this report:

"What do you think are the chief reasons FOR helping Greece and Turkey?"

Principal reasons given by voters: (1) To check communism and stop Russia; (2) Greece is starving, needs food, needs help;

(CONTINUED ON PAGE 171)

Steel Company 1946 Earnings Gain Despite Drop in Sales

New York

• • • Earnings of 22 steel companies, representing 88 pct of the nation's steelmaking capacity were 48.9 pct higher in 1946 than they were in 1945 despite a sales volume 19 pct lower. A study of the data on the insert at the right also shows that the 1946 average operating rate for these companies was 75.1 pct, 15.3 points lower than the previous year.

The steel and coal strikes early in the year seriously interfered with 1946 operations and it must be presumed that without them earnings would have been far better. Observers credit the good 1946 showing to operations in the last 6 months of the year when steel companies were finally able to settle down to uninterrupted production and to concentrate on those lines which yielded a more realistic return.

In comparing the two years' net income figures certain fiscal changes should not be overlooked. Income taxes were reduced and excess profits taxes eliminated in 1946. Further, many companies charged off emergency war facilities in 1945, making that year's net income look comparatively smaller.

Another factor which makes 1946 earnings loom much larger than 1945 figures was the transfer, in many companies, of funds from their contingency reserves to offset the first quarter steel and coal strike costs. In U. S. Steel Corp. the amount so transferred was about \$29 million; at Bethlehem it was \$11 million. In the reports of some companies tabu-

Net Income of 22 Companies

Tabulated Is Up 49 Pct;
Sales Drop 19 Pct

• • •

By G. F. SULLIVAN
Assistant News Editor

• • •

lated at the right it should be noted however that their accounting methods record income before transfer from reserves for contingencies.

Because last half operations in 1946 were responsible for the year's good showing, earnings in the first half of 1947 are expected to be excellent. Factors which might adversely affect 1947 earnings are wage boosts, "extra"

price reductions or serious strikes. The price of scrap, which earlier this year was at least double the former OPA ceilings could also be a factor should its recent decline be reversed.

Spotting the highlights of the data reported by 88 pct of the steel industry it will be seen that despite substantially higher net income in 1946, income taxes were about the same, \$117 million compared to \$113 million. Common stock in the hands of the public gained 14 pct, dividends were up 8 pct.

Capitalization of these companies, per ton of rated capacity was up about 4 pct in 1946 over 1945. Net income went from \$2.05 per ton of ingot capacity to \$3.05, a 49 pct gain. In relation to tonnage actually produced the gain was 77 pct, an increase from \$2.29 to \$4.05 per net ton.

The First Ten

New York

• • • Net income in thousands of dollars of the first ten steel companies (rated in order of steel capacity) with the pct change in 1946 over 1945 is as follows:

Company	1946	1945	Pct Increase 1946 over 1945
U. S. Steel Corp.....	\$88,622	\$58,015	52.8
Bethlehem Steel Corp.....	41,732	34,947	19.4
Republic Steel Corp.....	16,033	9,543	68.0
Jones & Laughlin Steel Corp.....	10,854	8,082	34.3
Youngstown Sheet & Tube Co.....	14,255	7,512	89.8
National Steel Corp.....	20,462	11,118	84.0
Inland Steel Co.....	15,557	9,861	57.8
American Rolling Mill Co.....	18,552	9,415	97.0
Sharon Steel Corp.....	2,858	1,029	177.7
Wheeling Steel Corp.....	5,373	3,950	36.0
Total	\$234,298	\$153,472	52.7

the western railroad companies.

Declaring that the charges presented in this respect at the recent Geneva steel rate hearing had been in such "very general terms" that the ICC was not warranted in going ahead on its own initiative, the Kaiser Co. was asked to provide a statement as to the commodities, their origins and destinations and the rates charged.

"If it is desired to secure a de-

termination as to the lawfulness of the rates to and from the Fontana plant and an order prescribing rates in approximate synchronization with the investigation of rates from Geneva, it will be necessary to bring the complaint before us with sufficient clarity and precision to advise the carriers and others as to its nature and substance," the Kaiser counsel was advised. "Because of the time element, this should not be delayed."

Asks Kaiser for Facts On Freight Reductions

Washington

• • • In a letter dated Mar. 28 from Chairman Clyde B. Aitchison to Thomas K. McCarthy, counsel to the Kaiser Co., Inc., the ICC has requested the company to substantiate in detail its claims to the effect that requests for freight rate reductions on certain raw materials have been declined by

THE IRON AGE FINANCIAL ANALYSIS

DATA COVER THE OPERATIONS OF 22 COMPANIES

COMPANY	Year	Ingot Capacity Net Tons	Ingot Production Net Tons	Percent of Capacity Operated	Net Sales and Operating Revenue	Provision for Federal Income Taxes	Net Income	Net Income Percent of Sales
UNITED STATES STEEL CORP.	1946	29,500,000	21,287,000	72.9	\$1,496,064,326	\$32,000,000	\$88,622,475	5.9
	1945	28,800,000	26,479,000	82	1,747,338,661	30,000,000	58,015,056	3.3
BETHLEHEM STEEL CORP.	1946	12,900,000	10,012,480	77.6	787,720,668	15,500,000	41,731,931	5.3
	1945	12,900,000	11,831,610	91.7	1,326,563,896	12,200,000	34,947,116	2.6
REPUBLIC STEEL CORP.	1946	8,600,000	6,260,047	70.3	412,755,542	9,000,000	16,033,469	10.1
	1945	8,900,000	7,545,825	79.2	497,675,322	15,952,608	9,543,443	10.1
JONES & LAUGHLIN STEEL CORP.	1946	4,741,500	3,806,839	80	246,297,831	4,560,000	10,854,084	4.4
	1945	5,024,400	4,421,112	88	284,741,818	1,558,000 ¹	8,082,082	2.8
YOUNGSTOWN SHEET & TUBE CO.	1946	4,002,000	3,242,135	81	216,276,426	9,275,000	14,254,905	6.6
	1945	4,002,000	3,754,434	93.8	230,399,216	6,500,000	7,512,250	3.3
NATIONAL STEEL CORP.	1946	3,900,000	.....	.....	239,764,320	13,875,000	20,461,651	8.5
	1945	3,900,000	.....	.....	271,832,560	16,000,000	11,117,764	4.1
INLAND STEEL CO.	1946	3,400,000	2,811,003	82.7	217,739,493	8,998,150	15,556,897	7.1
	1945	3,400,000	3,507,686	103.2	217,386,432	8,245,208	9,861,210	4.5
AMERICAN ROLLING MILL CO.	1946	3,237,000	2,738,009	84.6	231,930,811	11,731,789 ²	18,552,491	8.0
	1945	3,382,000	2,992,020	88.5	220,144,648	10,424,740 ²	9,414,647 ³	4.3
SHARON STEEL CORP.	1946	1,500,000	874,190	59	55,021,144	1,775,000 ²	2,857,856 ⁴	5.2
	1945	636,000 ⁵	582,126	91.5	40,803,078	2,545,700 ²	1,029,074	2.5
WHEELING STEEL CORP.	1946	1,344,000 ⁶	1,264,414	76.54	110,397,692	2,082,000	5,372,910	4.9
	1945	1,960,000	1,876,906	95.76	143,154,065	3,420,000	3,950,252	2.8
COLORADO FUEL & IRON CORP. ¹⁶	1946	1,452,000	.....	.....	58,118,237	400,000	334,751	.....
	1945	1,272,000	.....	.....	57,171,800	1,516,400	1,954,979	.....
CRUCIBLE STEEL CO. OF AMERICA	1946	1,273,350	.....	.....	88,125,055	1,505,024 ⁷	527,417	0.6
	1945	1,392,660	.....	.....	141,422,880	2,161,347 ⁷	1,565,847	.....
PITTSBURGH STEEL CO.	1946	1,072,557	838,219	78.1	54,194,854	100,000	45,640	0.8
	1945	1,072,557	809,272	75.4	53,604,417	None	109,442	.....
LUKENS STEEL CO. ⁸	1946	624,000	497,621	79.7	30,289,067	270,898 ⁷	651	.....
	1945	624,000	644,453	103.3	45,243,988	3,410,000 ⁷	2,751,478	6.1
ALAN WOOD STEEL CO.	1946	550,000	348,378	63.34	25,263,991	414,000 ⁹	793,941	3.1
	1945	550,000	444,488	80.82	26,057,554	195,857 ⁷	307,738	1.2
MIDVALE CO.	1946	517,322	77,067	14.90	.....	None	1,861,284 ¹⁰	.....
	1945	517,322	179,129	34.63	.....	1,700,000	1,805,895	.....
ALLEGHENY LUDLUM STEEL CORP.	1946	460,360	367,408	79.81	95,277,573	5,031,152	6,599,346	6.9
	1945	460,360	381,600	82.89	100,401,059	7,851,096	3,379,369	3.4
GRANITE CITY STEEL CO.	1946	403,200	155,786	38.6	8,567,977	.....	481,690 ¹¹	0.4
	1945	578,200	392,351	67.9	18,957,078	75,000	68,288	.....
CONTINENTAL STEEL CORP.	1946	364,000	293,527	80.6	24,330,784	900,000	946,119	3.9
	1945	364,000	354,380	97.4	23,564,277	495,000	612,543	2.6
LACLEDE STEEL CO.	1946	326,025	275,002	84.3	17,140,184	474,500	675,303	3.9
	1945	326,025	271,952	83.4	15,158,127	195,000	320,312	2.1
KEYSTONE STEEL & WIRE CO. ¹⁴	1946	302,400	285,148	94.3	23,610,560	2,704,895	3,379,018	14.3
	1945	302,400	283,643	93.8	21,169,892	2,514,000	1,623,223	7.7
VANADIUM-ALLOYS STEEL CO.	1946	18,936	12,519	70	7,715,036	365,200	543,756	7.0
	1945	18,936	14,242	80	9,764,973	1,076,100	641,509	6.6
GRAND TOTAL	1946	80,308,650	55,446,792	75.1	\$4,446,602,371	\$117,347,046	\$245,132,129	5.5
	1945	80,382,860	66,766,229	90.4	5,492,555,741	112,576,648	164,662,939	3.0

1—Not including \$4,925,000 tax carryback refund.

2—Includes all income taxes.

3—Before extraordinary and non-recurring adjustments.

4—Before transfer of \$600,000 from reserve for contingencies.

5—Does not include 844,200-ton capacity of Farrell plant acquired Dec. 15, 1945.

6—As of Dec. 31; the 1946 average was 1,652,000 tons.

7—Credit, due to tax carryback.

8—For fiscal years ended Oct. 5, 1946 and Oct. 6, 1945.

9—Deduct \$63,718 credit from prior years.

10—Estimated tax carryback of \$3,234,658 results in net transfer of \$1,373,374 to surplus.

11—Company closed by 7-month strike in 1946.

12—On adjusted basis; common stock split 2 $\frac{1}{2}$ for 1 in

13—Plus 50¢ declared Dec. 27, 1946 and paid Jan. 15, 1947.

14—Non-audited book figures for calendar years. Compares June 30 fiscal year basis.

15—Includes \$139,959 dividends paid on old 6 per cent preferred stock retired in June 1945.

16—For fiscal years ended June 30.

FINANCIAL ANALYSIS OF THE STEEL INDUSTRY

INFORMATION OF 22 COMPANIES REPRESENTING 88 PCT OF THE INGOT CAPACITY OF THE U.S.

Division Federal come axes	Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnings Per Common Share	Common Dividends Paid	Number of Preferred Shares Outstanding	Preferred Dividends Paid	Inve Cap
1,000,000	\$88,622,475	5.9	8,703,252	7.29	\$34,813,008	3,602,811	\$25,219,677	\$1,535,715
1,000,000	58,015,056	3.3	8,703,252	3.76	34,813,008	3,602,811	25,219,677	1,504,642
500,000	41,731,931	5.3	2,984,994	11.79	17,909,964	933,887	6,537,209	664,155
200,000	34,947,116	2.6	2,984,994	9.52	17,909,964	933,887	6,537,209	642,135
1,000,000	16,033,469	....	5,669,922	2.53	5,669,907	282,143	1,692,858	336,182
952,608	9,543,443	....	5,669,922	1.36	5,669,907	282,143	1,832,817 ¹⁵	335,230
560,000	10,854,084	4.4	2,476,502	3.79	4,736,195	293,568	1,649,244	234,286
558,000 ¹	8,082,082	2.8	1,998,212	2.91	3,262,463	453,582	2,886,204	230,270
275,000	14,254,905	6.6	1,675,008	8.51	5,025,024	None	None	199,196
500,000	7,512,250	3.3	1,675,008	4.12	3,350,016	None	618,750	196,221
875,000	20,461,651	8.5	2,230,642	9.17	7,231,487	None	None	207,207
1,000,000	11,117,764	4.1	2,206,492	5.04	6,619,195	None	None	184,153
998,150	15,556,897	7.1	4,899,315	3.18	8,980,444	None	None	184,153
245,208	9,861,210	4.5	1,633,105	6.04	7,348,972	None	None	184,153
731,789 ²	18,552,491	8.0	3,241,315	5.35	4,050,666	199,930	1,181,059	180,204
424,740 ²	9,414,647 ³	4.3	3,241,315	2.58 ³	2,295,003	449,930	2,024,736	168,168
775,000 ²	2,857,856 ⁴	5.2	617,242	4.39 ⁴	679,896	None	149,150	24,20,298,600
545,700 ²	1,029,074	2.5	392,331	1.86	392,330	59,720	149,150	24,20,298,600
1,082,000	5,372,910	4.9	569,559	6.25	854,338 ¹⁸	363,166	1,815,830	116,116
420,000	3,950,252	2.8	569,559	3.75	854,338 ¹⁸	363,166	1,815,830	116,116
400,000	334,751	....	1,126,975	0.66	507,178	502,932	303,375	57,39
516,400	1,954,979	....	563,620	3.47	563,620	None	None	39,39
506,024 ⁷	527,417	0.6	444,230	1.19	None	313,682	1,578,105	92,92
1,161,347 ⁷	1,565,847	....	444,698	3.52	886,890	316,283	1,583,505	81,81
100,000	45,640	0.8	508,917	0.09	None	164,382	356,841	47,47
None	109,442	....	508,917	1.39	None	163,925	356,029	47,47
270,898 ⁷	651	....	317,976	0.002	None	None	None	13,13
1,410,000 ⁷	2,751,478	6.1	317,976	8.65	111,292	None	None	13,13
414,000 ⁹	793,941	3.1	200,000	1.46	....	71,824	251,384	16,16
195,857 ⁷	307,738	1.2	200,000	0.98	....	71,824	233,428	15,15
None	1,861,284 ¹⁰	....	600,000	3.10 ¹⁰	1,198,770	None	None	19,19
700,000	1,805,895	....	600,000	3.01	1,198,756	None	None	19,19
1,031,152	6,599,346	6.9	1,288,286	5.12	2,576,492	None	None	36,31
851,096	3,379,369	3.4	1,263,186	2.68	2,526,323	None	None	31,31
....	481,696 ¹¹	....	382,488	1.26	19,124	None	None	12,13
75,000	68,288	0.4	382,488	0.18	66,938	None	None	13,13
900,000	946,119	3.9	501,383	1.89	401,117	None	None	12,11
495,000	612,543	2.6	200,561	1.25 ¹²	401,122	None	None	11,11
474,500	675,303	3.9	206,250	3.27	206,250 ¹³	None	None	8,8
195,000	320,312	2.1	206,250	1.55	268,125	None	None	7,7
704,895	3,379,018	14.3	757,632	4.46	2,159,251	None	None	13,12
514,000	1,623,223	7.7	757,632	2.14	1,060,685	None	None	12,12
365,200	543,756	7.0	202,682	2.68	505,532	None	None	8,8
1,076,100	641,509	6.6	201,944	3.18	654,692	None	None	9,9
347,046	\$245,132,129	5.5	39,604,570	....	\$97,524,643	6,728,325	\$40,734,732	\$4,037
576,648	164,662,939	3.0	34,721,462	....	90,253,639	6,697,271	43,406,785	3,883

In adjusted basis; common stock split 2 1/2 for 1 in 1946.

¹lus 50¢ declared Dec. 27, 1946 and paid Jan. 15, 1947.

²Non-audited book figures for calendar years. Company is on

one 30 fiscal year basis.

³Includes \$139,959 dividends paid on old 6 pct preferred stock

retired in June 1945.

or fiscal years ended June 30.

17—Excluding companies not reporting ingot production.

18—Payable Jan. 2, 1946 & 1947.

Italics under "Net Income" indicate loss except in income tax

column.

INDUSTRY FOR 1946-1945

OF THE UNITED STATES IN 1946

	Invested Capital	Net Working Capital	Capitalization Per Ton of Ingot Capacity	Net Income Per Ton of Ingot Capacity	Net Income Per Ton of Ingot Production	Year	COMPANY
77	\$1,535,770,936	\$629,078,938	\$52.06	\$ 3.00	\$ 4.16	1946	UNITED STATES STEEL CORP.
77	1,504,622,822	600,760,252	52.24	2.01	2.19	1945	
99	664,817,896	308,180,756	51.54	3.24	4.17	1946	BETHLEHEM STEEL CORP.
99	642,601,108	339,343,779	49.81	2.71	2.95	1945	
68	336,471,468	128,370,684	39.12	1.86	2.56	1946	REPUBLIC STEEL CORP.
715	335,555,460	140,002,001	37.70	1.07	1.26	1945	
44	234,546,518	82,987,971	49.47	2.28	2.85	1946	JONES & LAUGHLIN STEEL CORP.
44	230,180,390	89,271,017	45.81	1.61	1.83	1945	
ne	199,301,154	109,815,802	49.80	3.56	4.40	1946	YOUNGSTOWN SHEET & TUBE CO.
50	196,131,543	100,879,425	49.01	1.88	2.00	1945	
ne	221,194,286	76,419,281	56.72	5.25	....	1946	NATIONAL STEEL CORP.
ne	207,718,121	78,865,828	53.26	2.85	....	1945	
ne	184,662,473	98,862,118	54.31	4.58	5.54	1946	INLAND STEEL CO.
ne	153,007,429	83,662,566	45.00	2.90	2.81	1945	
59	180,379,536	82,577,790	55.72	5.73	6.78	1946	AMERICAN ROLLING MILL CO.
36	168,964,499	79,854,505	49.96	2.78	3.15	1945	
50	24,507,134	15,404,068	16.34	1.91	3.27	1946	SHARON STEEL CORP.
00	20,283,715	13,784,255	31.89	1.62	1.77	1945	
30	116,436,815	48,227,215	86.63	4.00	4.25	1946	WHEELING STEEL CORP.
30	119,996,595	51,192,580	61.22	2.02	2.10	1945	
75	57,200,791	18,290,210	39.39	.23	....	1946	COLORADO FUEL & IRON CORP. ¹⁶
ne	39,929,626	13,724,964	31.39	1.54	....	1945	
05	92,810,142	34,148,026	72.89	0.41	....	1946	CRUCIBLE STEEL CO. OF AMERICA
05	81,924,610	50,974,127	58.83	1.12	....	1945	
41	47,094,909	20,721,518	43.91	0.04	0.05	1946	PITTSBURGH STEEL CO.
29	47,888,114	21,088,182	44.64	0.66	0.88	1945	
ne	13,733,422	7,311,975	22.00	0.01	0.01	1946	LUKENS STEEL CO. ⁸
ne	13,732,771	7,570,524	22.00	4.40	4.27	1945	
84	16,294,562	6,971,022	29.63	1.44	2.28	1946	ALAN WOOD STEEL CO.
28	15,752,005	7,306,216	28.64	0.56	0.69	1945	
ne	19,839,281	17,231,273	38.35	.360	24.10	1946	MIDVALE CO.
ne	19,664,677	17,189,749	38.01	3.49	10.08	1945	
ne	36,294,183	22,052,784	78.84	14.34	17.96	1946	ALLEGHENY LUDLUM STEEL CORP.
ne	31,785,206	20,979,333	69.04	7.34	8.86	1945	
ne	12,747,092	4,637,865	31.61	1.19	3.09	1946	GRANITE CITY STEEL CO.
ne	13,247,913	4,466,733	22.91	0.12	0.17	1945	
ne	12,346,723	7,782,801	33.92	2.60	3.22	1946	CONTINENTAL STEEL CORP.
ne	11,802,081	5,788,967	32.42	1.68	1.73	1945	
ne	8,859,433	5,011,203	27.17	2.07	2.39	1946	LACLEDE STEEL CO.
ne	7,043,504	3,493,394	21.60	0.98	1.18	1945	
ne	13,611,762	5,877,559	45.01	11.17	11.85	1946	KEYSTONE STEEL & WIRE CO. ¹⁴
ne	12,424,243	5,375,758	41.08	5.37	5.72	1945	
ne	8,588,837	4,725,274	45.36	28.72	43.43	1946	VANADIUM-ALLOYS STEEL CO.
ne	9,527,368	4,352,036	50.31	33.88	45.04	1945	
732	\$4,037,509,353	\$1,734,686,133	\$ 50.27	\$3.05	\$4.051 ⁷	1946	GRAND TOTAL
785	3,883,783,800	1,739,926,191	48.32	2.05	2.291 ⁷	1945	

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Tinplate Consumers Express Concern Over Small U.S. Allocations

New York

••• There is some alarm among tinplate consumers over the unexpectedly small tin allocations released last month by the Combined Tin Committee. They observe that the Committee has made an interim allocation of only 9326 tons to the United States for the first half of the year with prospects of a relatively small further allocation in May, as compared with tin consumption by this country for 11 months last year of 54,000 tons.

Canmakers believe that with the tin situation as inadequate throughout the world as indicated by the Committee's first half allocations, government action should be taken to reduce export tinplate tonnages wherever possible. It is significant that tinplate export allocations for the second quarter have been set at 120,000 short tons, an increase from last quarter's 55,000 tons, and compares with 1946 exports of 378,000 tons. Canmakers point out that these allocations are mandatory and not permissive.

This situation is particularly critical in the case of Argentina, who has recently contracted to buy 8000 tons tin content in ore a year from Bolivia when the country is in no position to smelt more than 25 pct of that tonnage. It is felt that any tinplate allocation to Argentina should be based on having them furnish the fine tin equivalent.

Government sources observe that export allocations of tinplate

Observers Foresee Ample Tin Supply for World Needs In Year and Half

•••

By JOHN ANTHONY
Eastern Regional Editor

•••

are largely designed for the conservation of food abroad, principally fruit and meat packing. They are calculated to take maximum advantage of the food potential of a war disrupted world, relieving to that extent any moral responsibility to provide food.

Although immediate prospects for an improvement in tin supply are very poor, information from Far Eastern sources indicates that within a year and a half tin production will be ample to meet world requirements.

Little tin has come out of the Netherlands East Indies since the end of the war and consequently the government smelter at Texas City, Tex., has been handicapped in its operations because of the lack of the high grade concentrates required as a sweetener. As early as last October the smelter's output was reduced, and from an average production of 4000 tons fine tin a month, it dropped to 3300 tons. January

and February production approximated 3000 tons a month. There was also a shortage of hydrochloric acid used in the process. There was a relatively greater loss in the production of Grade A tin.

Texas City production is expected to improve considerably when Netherlands Indies production begins to come out. By next summer tin production from this area may exceed the prewar production rate, according to informed observers. Two large dredges have been completed in the United States and are already en route to the East Indies. These dredges produce their own power, a shortage which has been primarily responsible for the delay in production. The dredges should be in operation early in June. Four additional dredges have been completed in the Netherlands and may even now be en route to the Indies.

Tin production in the Malay Peninsula is greatly behind the anticipated production schedule. In this area there has been a serious power shortage and labor has been inadequate. In the shortage of coal dredge owners have been turning to the use of oil as fuel. However, it is difficult to obtain even an adequate supply of oil. Several dredges in Malaya have been rehabilitated since the first of the year. The prospect for early large-scale production from this area is not promising, however.

Government sources, in discussing the first half tin allocations by the Combined Tin Committee, state that the tonnages allocated were set conservatively low so as to stretch out available supplies throughout the balance of the year. Even secondary tin resources were considered in making the allocations. At the time the allocations were made there was some reluctance to be liberal, for it was not known whether Congress would continue the tin allocating function of CPA. Termination would have led to speculative buying of the metal even at current high prices and a fur-

SHEET AND STRIP OUTPUT IN PER CENT OF TOTAL STEEL SHIPMENTS 1935 TO 1946

(Service American Iron & Steel Institute)

	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Hot-Rolled Sheets.....	13.2	12.3	12.3	12.2	14.6	13.5	13.1	9.9	9.9	9.7	11.2	12.2
Cold-Rolled Sheets.....	7.2	6.5	5.9	6.3	6.1	5.3	5.0	2.5	2.5	3.2	5.1	8.3
Galvanized Sheets.....	4.1	3.4	3.5	4.7	4.0	3.4	2.7	1.6	1.3	2.2	3.0	3.0
Total.....	24.5	22.2	21.7	23.2	24.7	22.2	20.8	14.0	13.7	15.1	19.3	23.5
Hot-Rolled Strip.....	7.5	6.0	5.3	4.4	3.3	2.9	2.9	2.1	2.2	2.3	2.4	2.8
Cold-Rolled Strip.....	2.4	2.3	2.1	2.0	1.9	1.7	2.2	1.6	1.9	1.9	2.3	2.7
Total.....	9.9	8.3	7.4	6.4	5.2	4.6	5.1	3.7	4.1	4.2	4.7	5.5
Grand Total.....	34.4	30.5	29.1	29.6	29.9	26.8	25.9	17.7	17.8	19.3	24.0	29.0

ther limitation of supplies to legitimate consumers. Allocations did not take into consideration Bolivian production for the United States because at that time the recent contract has not yet been negotiated.

Canmakers point out that the United Kingdom has about 19,000 tons of tin as compared with 17,000 tons in the United States, exclusive of U. S. Armed Forces reserves and Bolivian purchased stocks. They ask why 1200 tons of U. S. tin supply should be employed for tinplate exports to Canada, especially when their own tinplate capacity is sufficient for 50 pct of their requirements and the balance can be produced by Great Britain.

Government sources indicate that British exports of tinplate are three or four times those of a year ago. United Kingdom stocks of tin are declining slightly, with consumption of tin at the rate of 2500 to 3000 tons per month. At the end of Jan-

uary, British Government stocks included 8000 tons of metal and 7700 tons in concentrates; consumers' stocks totaled 3900 tons of metal. Moreover, part of the United Kingdom tin reserves is required to take care of the Continent's requirements.

In seeking an understanding of the Argentine purchase of Bolivian tin far beyond its own needs and smelting capacity, it is necessary to consider the economic and political background of the two countries. By this deal the Argentine Government strengthens itself politically by establishing a market for its food production. Bolivia establishes a more competitive market for its minerals resources. It is not anticipated that deliveries of tin ores to the Argentine will involve any of higher grade than the average 42 pct tin ores coming into Texas City. The higher grade Patino ores and concentrates will continue to go to the United Kingdom.

Sees Large Exports Of Aeronautical Products

Washington

• • • Continued large aviation exports of aeronautical products were forecast for 1947 by the Office of International Trade in releasing the information that these amounted to nearly \$115 million in 1946.

Included in the total were 2343 civilian planes valued at nearly \$65 million, 59 military type planes valued at more than \$1 million, 2490 aircraft engines valued at \$12 million, and parts and accessories valued at nearly \$30 million.

France led all countries in aircraft purchases with Canada, the Netherlands and Brazil following in that order.

Approximately 1400 of the planes were from new production and most of the remainder was surplus. However, orders for 1947 delivery now on the books include about 135 two and four-engined commercial planes with a total value of about \$75 million.

Coming Events

- Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
- Apr. 14-16 National Machine Tool Builders' Assn., spring meeting, Atlantic City, N. J.
- Apr. 14-17 Southern Machinery & Metals Exposition, Atlanta.
- Apr. 14-17 Electrochemical Society, Inc., Louisville, Ky.
- Apr. 21-23 American Institute of Mining & Metallurgical Engineers, openhearth, coke oven, blast furnace and raw material committees, annual conference, Cincinnati.
- Apr. 28-29 American Zinc Institute, annual meeting, St. Louis.
- Apr. 28-May 1 American Foundrymen's Assn., convention, Detroit.
- Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.
- May 5-6 National Welding Supply Assn., convention, Philadelphia.
- May 6-10 Society of the Plastics Industry, Inc., exposition, Chicago.
- May 12-15 American Steel Warehouse Assn., annual meeting, Los Angeles.
- May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
- May 21-22 American Iron & Steel Institute, annual meeting, New York.
- May 26-27 Assn. of Iron & Steel Engineers, annual spring conference, Philadelphia.
- May 27 Metal Powder Assn., spring meeting, New York.
- June 2-4 American Gear Manufacturers, Hot Springs, Va.
- June 9-11 American Coke & Chemical Institute, annual meeting, French Lick, Ind.
- June 15-19 American Society of Mechanical Engineers, semiannual meeting, Chicago.
- June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.
- June 17-19 Machinery Dealers National Assn., convention, Cincinnati.
- June 23-27 American Electroplaters Society, industrial finishing show, Detroit.
- July 14-18 American Society of Civil Engineers, Duluth, Minn.
- Aug. 25-29 National Assn. of Power Engineers, Inc., Boston.
- Sept. 8-12 Instrument Society of America, conference, Chicago.
- Sept. 10-12 Porcelain Enamel Institute, Inc., Columbus, Ohio.

Gets Concrete Bar Award

Washington

• • • The Southwest Steel Rolling Mills, Los Angeles, has been awarded contracts for concrete reinforcing bars amounting to \$206,898, according to an announcement of the Bureau of Reclamation. The material is to be used for irrigation projects in the Pacific Northwest.

The Bureau also announced the awarding of a contract amounting to \$99,716 to the Willamette Iron & Steel Co., Portland, Ore., for the construction of high pressure gates for dams in Nebraska and Colorado.

Plant Offered for Sale

Washington

• • • A partially-built plant designed to produce rubber and textile products but which WAA says could easily be adapted to the manufacture of iron and steel and automotive parts on completion is offered for sale at Nashville, Tenn. Including the foundations, WAA said construction is about 16 pct complete. The land tract is 57 acres.

The London ECONOMIST

Greeks and Gifts

THE speech in which Mr. Truman proposed on Mar. 12 a totally new foreign policy, to go into action on Mar. 31, took the lid off a witches' brew of hopes, fears and prejudices. The figures that steamed out in the first days of the hearing before the Foreign Affairs Committee of the House of Representatives were mostly in the guise of question marks. Those still to be discerned in the boiling confusion seem to have at least two heads apiece, and to be geared for simultaneous motion forward, backwards and sideways.

Nor has the timing helped to clarify the mixture. If the lid could have been lifted more gradually, the brew, simmering slowly, might have appeared more seemly, but the demand for haste on matters of such importance, having implications without metes or bounds, has shocked even a people conditioned to government by crisis into revelations that surprise themselves.

Not the least startling of these revelations is a sudden vision of Uncle Sam donning the tunic, shield, shinguards and short sword of a military republic. Yet the Roman parallel haunts those who do not like their civilian diplomacy and their military philosophy to be fused.

At this moment the nation's foreign policy is in the hands of the former head of the General Staff, an ex-Chief of Staff of SHAEF is ambassador in Moscow, military proconsuls operate in Germany and Japan. Selective Service (which is the American euphemism for conscription) has been dropped, but the machinery for reconstituting it has not been dismantled, and Congress is considering universal military service for all young males.

Meanwhile, 2 years after the ostensible end of the war, 30 pct of the national budget is still earmarked for defense. The prewar proportion was around 12 pct of a much smaller budget.

From this vision in the misty mirror, Americans react with immediate distaste. Almost the first question asked Mr. Acheson, the

Under-Secretary of State, by the Foreign Affairs Committee was whether the new policy meant war.

Americans do not want war, they are sensitive to charges of military intervention. Even when, earlier in the century, they sent marines into Latin America to help collect bad debts, they did it piously, and nothing in their history has led them to dream of parading as armed empire builders, or as schemers who arm mercenaries in a distant land to guard the outposts. Protests arising from this sensitivity have already reached Congress.

THE second disturbing vision, directly allied with the first, is that of Uncle Sam, having lavished hopes and cash on the United Nations, bypassing that organization in favor of unilateral action in an emergency of the very type for which everyone thought the United Nations was designed.

Criticism along this line has been so loud and pained that Senators Vandenberg and Connally have proposed a new preamble to the Administration's Bill which expressly states that American action is contemplated in view of the fact that "the United Nations is not now in a position to furnish to Greece and Turkey the financial and economic assistance which is immediately required," and "the furnishing of such assistance to Greece and Turkey by the United States will contribute to the freedom and independence of all members of the United Nations in conformity with the principles and purposes of the Charter . . ." The preamble is not subject to Russian veto.

ON the other hand—and in its present phase the discussion which surrounds Truman's new policy has almost as many hands as Briareus—the move to counter Russian expansion is to many Americans very welcome. In a people rapidly recovering from war weariness, and eager to get on with

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• • •

the business in hand, the continual Soviet policy of saying "No" has developed a degree of irritation which is almost as impelling as more profound fears.

Having discovered, as a surprising number of Americans think they have, that attempts to work with the Russians result in nothing but new stone walls, the logical next step would be to explore ways of working without them. If One World is impossible, what would be the boundaries of Two Worlds? And how can those who want to work be sure that those who want to obstruct will stay at home and keep out of the way? To conceal those questions has been to exacerbate distrust, and a policy that brings them out into the light may have a merit that will counterbalance its perils.

Thus the Administration's first ally in pushing through the new policy is this attitude of apprehension and irritation toward Russia. A possible second ally, the idea that this nation, now the richest and most powerful in the world, must accept from the tired hands of Britain responsibility for a rather unsightly share of what used to be called the white man's burden, is more difficult to exploit because it meets resistance in old prejudices and disbelief.

If too much stress is laid on the desirability of assuming British commitments, Americans begin to look at maps, to discover that Palestine lies not far to the south of Turkey, and that Saudi Arabian oil fields are not too remote. Russia has already mentioned the latter fact, and American liberals who have already said that they do not like the idea of propping up a

(CONTINUED ON PAGE 173)

Railroad Expenditures For Equipment in 1946 Reached \$561.9 Million

Washington

• • • Capital expenditures for equipment and other improvements to railway property made by Class I railroads in 1946 totaled \$561,957,000, according to the Assn. of American Railroads. With the exception of 1945, when such expenditures totaled \$562,980,000, capital expenditures in 1946 were greater than in any year since 1930.

The same railroads in 1946 expended \$1,570,555,000 for fuels, materials and supplies, a slight decrease from the 1945 total of \$1,572,404,000.

In regard to capital expenditures, the total authorized for 1946 was considerably in excess of the amount actually expended due to the inability of the railroads to secure adequate supplies of materials. Carry-over of unex-

pended authorizations for equipment remaining on Jan. 1, 1947, totaled \$451,894,000, the greatest amount of carry-over for any corresponding period in the past 23 years, or since the compilation of these records began in 1923. Of this amount, \$166,746,000 was for freight cars and \$168,948,000 was for passenger train cars. Both figures are new records. For locomotives, the carry-over was \$106,536,000.

For freight cars, capital expenditures actually made in 1946 amounted to \$159,282,000 compared with \$138,114,000 in 1945. For passenger cars, the amount of capital expenditures in 1946 was greater than in any year since 1927, totaling \$47,169,000 compared with \$30,843,000 in 1945. For locomotives, capital expenditures totaled \$97,310,000 compared with \$127,934,000 in 1945.

Expenditures for iron and steel products of all kinds amounted to \$520,546,000 in 1946 compared with \$520,876,000 in 1945.



UP IN THE AIR:
Pig iron, storm center of many government pep drives, is seen by CPA as a critically short item which may hurt the national economy. But an IRON AGE study of American Iron & Steel Institute data shows a far more optimistic merchant pig iron outlook. (THE IRON AGE, Apr. 3, p. 103).

Releases Report On German Coking Process

Washington

• • • The substitution of low-temperature coke for bituminous coal in household heating offers promise of contributing materially to smoke-abatement campaigns of various American cities, the Bureau of Mines reported in a new publication describing a German-developed process for making this fuel, Dr. R. R. Sayers, Director of the Bureau, announced.

Low-temperature coke offers a fuel that is smokeless, highly reactive, and easily ignited, the Bureau report points out.

Known as the Krupp-Lurgi process, the method was used in two commercial installations, one in Germany and one in the Saar, to produce low-temperature coke for household and industrial use, the Bureau publication disclosed.

Technical information on the Krupp-Lurgi process was obtained by members of the Solid Fuels Mission to Germany investigating wartime developments in coal mining, preparation and utilization. The report was prepared by L. D. Schmidt, now supervising engineer of the Bureau's Synthesis Gas Production laboratories at Morgantown, W. Va., who was a member of the Solid Fuels Mission.

A copy of the report, Information Circular 7395, "Low-Temperature Coke by the Krupp-Lurgi Process," may be obtained by writing to the Bureau of Mines, Dept. of the Interior, Washington 25, D. C.

Okays Building of Three Electric Power Plants

Washington

• • • Construction of three electric power generating plants at a combined cost of more than \$5.5 million has been approved by CPA's review committee.

Authorized were a new Illinois Power Co. plant at Wood River, Madison Co., Ill., at a cost of \$2,076,000, to serve its southern system; and power plant additions for the Toledo Edison Co., Toledo, at a cost of \$1,801,800 and for the Indiana & Michigan Electric Co., Mishawka, Ind., at a cost of \$1,634,000.

Report Iron and Steel Prices in Canada Will Be Advanced This Year

Toronto

• • • While the list of items on which government control has been discontinued, as announced by Finance Minister Abbott in the House of Commons, did not include iron and steel, officials of Wartime Prices & Trade Board stated in Ottawa earlier last week that iron and steel prices would be increased this year. However, they did not say how much the increase might be nor when it would go into effect. With the exception of cold-rolled steel, a comparatively new product to Canadian production which does not come under ceiling price control, iron and steel prices in this country range anywhere from \$5 to \$10 per ton below United States prices on materials laid down at Canadian consuming points.

As a result of the uncertainty regarding future prices for iron and steel, Canadian producers in accepting forward delivery contracts specify that prices will be made known at time of shipment. Also there is a tendency on the part of steelmakers to curb consumer buying if there are indications of excessive inventory building. Thus in the event of price increases producers will be in a position to reap full benefits.

Due to the fact that most large steel consumers are on a monthly quota basis regarding steel deliveries, and that mills are almost solidly booked to the end of this quarter, new order placing has been sharply curbed. However, there is no lack of interest in the markets and inquiries continue to pour in for practically all lines of steel. Heavy orders for rolling stock recently placed by Canadian National Railways and the Canadian Pacific Railway have resulted in a further uplift in demand for steel.

On most lines of steel, Canadian mills are plugged with orders and production capacity is fully covered to the end of June. On steel sheets, black and galvanized, mills are booked solid through the second quarter, and not accepting commitments into third quarter have withdrawn from the market. On carbon steel bars bookings in most mills are solid for two

months ahead and in some instances to the end of the quarter.

Alloy bars, however, are still in good supply and producers are seeking additional business. Demand for steel plate has been expanding at a rapid rate and it is

pointed out that domestic production now falls far short of meeting requirements, with the result that consumers are endeavoring to increase imports of plate from the United States. No change is reported in wire and nails.

Canada Drops Controls On About One-Third Of Products and Services

Ottawa

• • • Canada has abandoned controls on approximately one-third of controlled goods and services, effective Apr. 2, Finance Minister Abbott announced in the House of Commons. All motor vehicles, coal, coke, charcoal, fuel and footwear have been decontrolled. Household equipment such as stoves, electrical and gas; refrigerators of all kinds; washing machines, sewing machines, plumbing and sanitary equipment have been dropped from the controlled list.

Selective price ceiling decontrol has been announced on a range of clothing not made from leather, cotton or rayon; all chemicals and plastics; products in the paper and paper product field and a wide range of building materials.

While controls have been discontinued on a long list of items, numerous articles still remain

under the control system. Donald Gordon, chairman of Wartime Prices & Trade Board, issued a lengthy list of items that continue under price ceilings and control which includes the following:

Iron and steel and most of their products, such as basic iron and steel and their products and alloys; pig iron, cast iron, scrap, ingots, bars, plates, rods, wire and nails; primary, secondary and fabricated mill forms of nonferrous metals and their alloys, copper, lead, zinc and tin.

Most items in the agricultural implement field remain under control, including planting, seeding and fertilizing equipment, plows, tillage implements and cultivators, haying machinery, harvesting machinery, tractors, wagons, dairy machines and equipment, sprayers and dusters.

Cast iron soil pipe and fittings are still controlled and also are jacket heaters and other water heating equipment, furnaces, fireplace heaters and other heating equipment, except portable electric heaters.



Courtesy Lindberg Engineering Co.

Industrial Briefs . . .

- BUYS TOOL FIRM — The Sheffield Corp., Dayton, has made arrangements to purchase control of the Murchey Machine & Tool Co., Detroit. The latter concern manufactures machine tools, principally threading tools and tooling, thread chasers, die heads and collapsible taps. It is understood the business has total assets of approximately \$400,000.
- BUYS FURNACE PROPERTY — Purchase by International Detrola Corp. of the Wheeling Steel Corp.'s blast furnace property in Martins Ferry, Ohio, has been announced. The figure was not disclosed. The Martins Ferry furnace, which has been idle, is expected to be returned to operation in about 60 days, and employ about 120 persons.
- RENOVATES FOUNDRY — Complete renovation of the grey iron foundry of The Babcock & Wilcox Co.'s plant, Barberton, Ohio, at a cost of more than half a million dollars has been announced. The renovation will include improvements to the building as well as machinery replacements and new equipment. In the grey iron foundry \$151,000 will be spent for building improvements which will include a concrete floor, repainting the interior and increasing the amount of glass in the walls and ceiling.
- \$1 MILLION EXPANSION — Expansion of tire manufacturing facilities at its Miami, Okla., plant involving an expenditure in excess of \$1 million was announced by The B. F. Goodrich Co. The new expenditures are earmarked for new equipment which will be installed by July 1, Mr. Graham said.
- EXPANSION PLANS — The Carborundum Co., Niagara Falls, N. Y., announce plans for a \$20 million expansion program in its first formal report to the public, which showed net earnings for 1946 of \$2,568,726, or \$5.04 a common share, compared with \$1,571,206 or \$3.09 a share in 1945.
- CHANGES NAME — Pallet Sales Co., New York, pioneer in the design and construction of a wide variety of pallets used in conjunction with modern materials handling practices, announced it would be known henceforth as Pallet Sales Corp. Under a program of expansion, Pallet announced it will have increased facilities available to practically all industrial areas.
- BUYS WAA PLANT — Fitchburg Engineering Corp., Fitchburg, Mass., has purchased, through the WAA, a plant built by the government during the war at a cost of \$565,000. The engineering company makes special tools, operated the plant in connection with its own during the war and paid \$215,000 cash for it.
- CAN MAKER — Atlas Imperial Diesel Engine Co. of Oakland, Calif., has purchased the can-making plant of Continental Can Co. at Fullerton, Calif., for approximately \$750,000. Last year Atlas entered the can-making machinery field. According to R. J. Miedel, Atlas president, his company has already entered on a contract to furnish cans to Hunt Foods, Inc., which is adjacent to the newly-acquired can plant.
- COMPLETES EXPANSION — American Fork & Hoe Co. has completed expansion of the finishing and assembly departments of its Dunkirk, N. Y., plant, including the installation of additional production machinery and other equipment. Capacities of the two departments were increased by one-third and an early increase in the working force is in prospect, according to the company.
- BRAZILIAN OFFICE — Independent Pneumatic Tool Company, of Chicago, manufacturers of Thor portable pneumatic and electric tools, announces the opening of a technical office at Sao Paulo, Brazil.

Two-Way World Trade Industrial Necessity, Commerce Head Says

Pittsburgh

• • • In a sharp warning to industry in the western Pennsylvania area, E. E. Schnellbacher, official of the Office of International Trade, U. S. Dept. of Commerce, stated that if industry wants to keep healthy it must be fed by and, in turn, feed foreign markets. Mr. Schnellbacher addressed about 200 at the dinner meeting of the first Pittsburgh World Trade Conference on Mar. 31.

Without imports, the industries that have made Pittsburgh the "Steel City" never would have been born, he pointed out, and without foreign markets these industries could not have been nurtured to their present size. The value of U. S. exports of iron and steel products in 1920 was \$108,000. This total was multiplied 10,000 times to more than \$1 billion 100 years later.

Mr. Schnellbacher urged a mass awakening to the vital importance of two-way world trade. Without a thriving export trade, he reiterated, the mills and plants can't work at top speed, providing employment and profits. Expanding imports are even more essential to Pittsburgh because of the type of industry that has developed here. The importance of imports he stressed by showing that automotive manufacturers must buy 300 types of materials from 55 countries to keep assembly lines running.

Importation of raw materials alone by the United States is not enough, Mr. Schnellbacher said. He believes the scope of imports must be increased by American imagination and daring to balance the import-export ratio.

At the Pittsburgh World Trade Conference, eight speakers discussed the foreign trade problems. Serge Kouschnareff, an official of the Federal Office of International Trade, discussed packaging and marking. Gene Sitterly, New York publisher, declared that United States was ready to assume the position of the leader of world trade. With Western Europe wrecked by the war, it will assume its ranking role as buyer of American products.

Construction Steel . . .

• • • Fabricated steel awards this week included the following:

5000 Tons, San Francisco, Pacific Telephone & Telegraph Co., Franklin Exchange building, to American Bridge Co., Pittsburgh.

2500 Tons, Lexington, Ky., memorial stadium to Midland Structural Steel Co., Cicero, Ill.

2000 Tons, Hillside, Ill., building, Aluminum Co. of America to Midland Structural Steel Co., Cicero, Ill.

1500 Tons, San Francisco, Pacific Telephone Telegraph Co., Mission Exchange building, to American Bridge Co., Pittsburgh.

1300 Tons, Jenks, Okla., Arkansas River bridge subdivided as follows: 250 tons to Tulsa Boiler & Machinery Co., Tulsa, Okla.; 350 tons to Patterson Steel Co., Tulsa; 350 tons to Virginia Bridge Co., Roanoke, Va., and 350 tons to Kansas City Structural Steel Co., Kansas City, Kan.

1250 Tons, Chicago, Unit No. 18 Fiske Station to Bethlehem Steel Co., Bethlehem, Pa.

500 Tons, Springfield, Ill., Pillsbury mills building to Hansell-Elcock Co., Chicago.

500 Tons, Cambridge, Mass., senior dormitory for M.I.T. to Phoenix Iron Co., Phoenixville, Pa., through George A. Fuller Co., Boston, engineers.

230 Tons, Cumberland County, Pa., Pennsylvania Dept. of Highways, Route 21045, to Bethlehem Steel Co., Bethlehem, Pa.

200 Tons, Hopewell, Va., boiler plant to Virginia Bridge Co., Roanoke, Va., through Stone & Webster Engineering Co., Boston, engineers.

120 Tons, Waynesboro, Pa., Landis Tool Co., alterations, to Bethlehem Steel Co., Bethlehem, Pa.

110 Tons, Bensonville, Ill., Kieckhefer factory building to Milwaukee Bridge Co., Milwaukee.

100 Tons, Hancock, Md., apple packing plant, to Bethlehem Steel Co., Bethlehem, Pa.

• • • Fabricated steel inquiries this week included the following:

7500 Tons, Peoria, Ill., factory building, Caterpillar Tractor Co., Peoria, Ill.

3000 Tons, Houston, Humble Oil & Refining Co. building.

2250 Tons, Port of New York Authority, freight station.

2000 Tons, State of New Jersey, Passaic River bridge.

1360 Tons, Tacoma, Wash., three railroad bridges and two highway bridges, Seattle District, Corps of Engineers, Serial No. W-45-108-eng-47-45, bids to be called shortly.

1000 Tons, Urbana, Ill., chemical building, University of Illinois.

900 Tons, Tipton, Iowa, Cedar County bridge F-469-3.

750 Tons, Hazleton, Pa., St. Joseph's Hospital, George E. Yundt, Allentown, Pa., May.

730 Tons, Northfield, Ill., Willow Road grade separation abandoned.

475 Tons, Stratford, Iowa, Webster County F-811-4.

425 Tons, Firebaugh, Calif., bridges across San Joaquin River and Overflow, California Div. of Highways, Sacramento, bids to Apr. 30.

300 Tons, Fox Chase, Philadelphia, Institute for Cancer Research, building, Apr. 10.

240 Tons, Lancaster, Pa., Armstrong Cork Co., addition to administration building, Apr. 17.

230 Tons, Douglas County, Wis., state highway construction.

200 Tons, Marquette, Mich., diesel shop for Duluth South Shore R.R.

200 Tons, Houghton, Mich., building, Michigan College of Mining.

200 Tons, Wood County, Wis., state highway construction.

W-45-108-eng-47-45, bids to be called shortly.

120 Tons, Firebaugh, Calif., bridges across San Joaquin River and Overflow, California Div. of Highways, Sacramento, bids to Apr. 30.

100 Tons, Chicago, building, Goodman Mfg. Co.

• • • Sheet piling awards this week included the following:

17,500 Tons, Long Beach, Calif., Port Manager, Spec. HD-232, to Bethlehem Pacific Coast Steel Corp., San Francisco.

17,500 Tons, Long Beach, Calif., Port Manager, Spec. HD-232, to Columbia Steel Co., San Francisco.

• • • Sheet piling inquiries this week included the following:

110 Tons, Whiting, Ind., Standard Oil Co. of Indiana.

• • • Railroad car awards this week included the following:

The Denver, Rio Grande & Western R.R. has ordered 500 50-ton gondolas from Pressed Steel Car Co., Pittsburgh. The New York, New Haven & Hartford R.R. has ordered 1000 50-ton box cars from Pullman Standard Car Mfg. Co. to be built at the Michigan City plant. The Southern R.R. has ordered 3000 50-ton box cars from Pullman Standard Car Mfg. Co. and 1000 50-ton hopper cars from American Car & Foundry, New York. The Wabash R.R. will build at its Decatur, Ill., shops 300 box cars. The Fruit Growers Express Co. will build at their Indiana Harbor shop 500 40-ton reefers and have also placed an order with American Car & Foundry for 500 of the same type cars.

• • • Railroad car inquiries this week included the following:

The Missouri, Kansas & Texas R.R. is inquiring for 500 70-ton hopper cars. The Bangor and Aroostook R.R. is inquiring for 150 50-ton hopper cars. The New Jersey, Indiana & Illinois R.R., subsidiary of Wabash R.R., is inquiring for 100 50-ton auto box cars.

British Unions Pledge Aid to Mining Industry

London

• • • Every effort will be made to provide the British mining industry with the machinery and equipment necessary to obtain the coal output required during the current year. This official statement was made following a recent meeting of the British Mineworkers Union and the Confederation of Engineering & Shipbuilding Unions to study the possibility of collaboration between miner and engineer trade unionists to speed the output of mechanical equipment for the pits.

Events leading up to this meeting were the persistent complaints by mineworkers that coal production was suffering from lack of spares, components and new modern machinery, and a suggestion from the engineering side that a concerted effort, draw-

ing in more subcapacity, could greatly expand the output of engineering mine equipment.

It is reported that the engineering unions will make further inquiries as to precisely what capacity is now engaged on mining machinery; what, if anything, is holding up production, and what steps might be taken to expand capacity. Further meetings between the two groups of trade unionists will be arranged to go further into the matter.

To Transfer Electric Plant

London

• • • Polish authorities are reported to have started taking over the large Szczecin harbor electrical works, following recent Polish-Soviet conversations. The first group of skilled workers and engineers have already begun work, and the final transfer will take place within a month.

MACHINE TOOLS

... News and Market Activities

High First Quarter Sales Indicate Good Machine Tool Year

• • • Predictions that 1947 is going to be a good machine tool year, which are in sharp contrast to reports of spotty business and slow markets, are being voiced by some major producers whose first quarter sales in some cases have been as high as 50 pct over the prewar (1935-39) average.

While it should go without saying that bears far outnumber the bulls in the present machine tool market, and that wartime plant expansions and improvements require twice the prewar business dollarwise to show a profit, March was a good month for some machine tool builders. That this situation is not general, however, is indicated by the number of companies who are on the market for contract work.

Removal of the surplus tools being sold under the Clayton formula to the fixed price category is not expected to make any difference to the industry under the present circumstances. According to reports, the days of buying 15 or 20 surplus machines at a clip are about over, and unless the part of the surplus still undeclared in stand-by plants or on contract to lessees brings forth some unusual bargains, the worst of the surplus machine tool dilemma is over. Machine tools are moving very slowly with WAA.

In Detroit, except for some activity in connection with the introduction of the new Packard convertible and a scattering of foreign business, the machine tool market generally is very slow. A hurdle constantly confronting the automobile machine tool builders is the rather widely held opinion that automobile tooling costs are "about three times as much as prewar."

As one authority analyzed this statement, this increase obviously includes the more elaborate tooling being used today by the industry as well as the increased unit cost of machines and the increase in unit costs can hardly account

Heyday for Sale of Surplus WAA Tools Is Passed As Tools Move Slowly

• • •

for more than a third of the total increase. That is to say, unit costs are up possibly as much as 100 pct in some cases, but the bulk of the increase in tooling costs is accounted for by more elaborate tooling rather than by a jump in the unit cost of tools.

Generally speaking, the volume of sales of standard machines has fallen off in Detroit to a whisper, although builders of certain specialized labor-saving machines and producers with substantial quantities of foreign orders on their books continue to operate at better than satisfactory levels.

In Cincinnati the machine tool market shows no appreciable change. A fair volume of domestic ordering continues to flow in and foreign demand is unchanged. Some jitters were discernible the past week, on the basis of the coal miners' mourning period, in that here and there in the trade fear of further labor trouble was expressed. Of course, should the mine shutdown extend too long, machine tool men would suffer, so that this situation is being watched with care. Currently production is unchanged, but backlog are being reduced sharply.

In the East, machine tool builders are gradually expanding export operations and are confident this business will count materially in their final 1947 showings. Some 20 countries are buying from New England producers and on this side of the Atlantic, tools and parts are going to Mexico, Central America, Brazil, Argentina and Canada. Brazil and Argentina are buying from more individual tool companies than the other countries.

In Europe, orders come from England, France, Belgium, Holland, Sweden, Switzerland, Portugal, Finland and Russia. Russia has bought more tools than other European countries, but from no more individual firms than has England. Business is also being done with India and China. Tool makers expect big things from Japan as soon as the political picture there has cleared. Export sales are largely lathes ranging from bench to large sizes, various kinds of grinders, cutting machinery and broaches.

In Cleveland, on net sales of \$2,146,503, the Cleveland Hobbing Machine Co. in the year ended Dec. 31, 1946, had a net profit of \$170,873, equal to \$1.88 per share. This compares with \$1.87 per share in 1945. Cleveland Hobbing paid \$1.15 per share in dividends and spent \$38,600 in equipment and buildings, over half of which was a carry-over of 1945 appropriations.

Harvey H. Brown, Jr., president, reported that currently the company has orders totaling \$1,620,000, which is more than one and one-half times the total inventory.

He said a new rotary hobbing machine of greater capacity and range was developed in 1946 and had a wide acceptance. Cleveland Hobbing Machine hopes to be able to announce several more products in 1947.

National Tool Co.'s net income for 1946 was \$75,784, equal to 33¢ per share, compared with \$58,420, or 25¢, for 1945, president Harry W. Barkley reported. Net sales for 1946 were \$2,056,875, a decrease of 5.1 pct from 1945 sales of \$2,167,282. Mr. Barkley reported a sharp increase in the rate of shipments during the last half of 1946, with this trend continuing through the first quarter of 1947. Orders are currently being received in satisfactory volume, and present backlog is more than double that at the start of 1946, Mr. Barkley said.

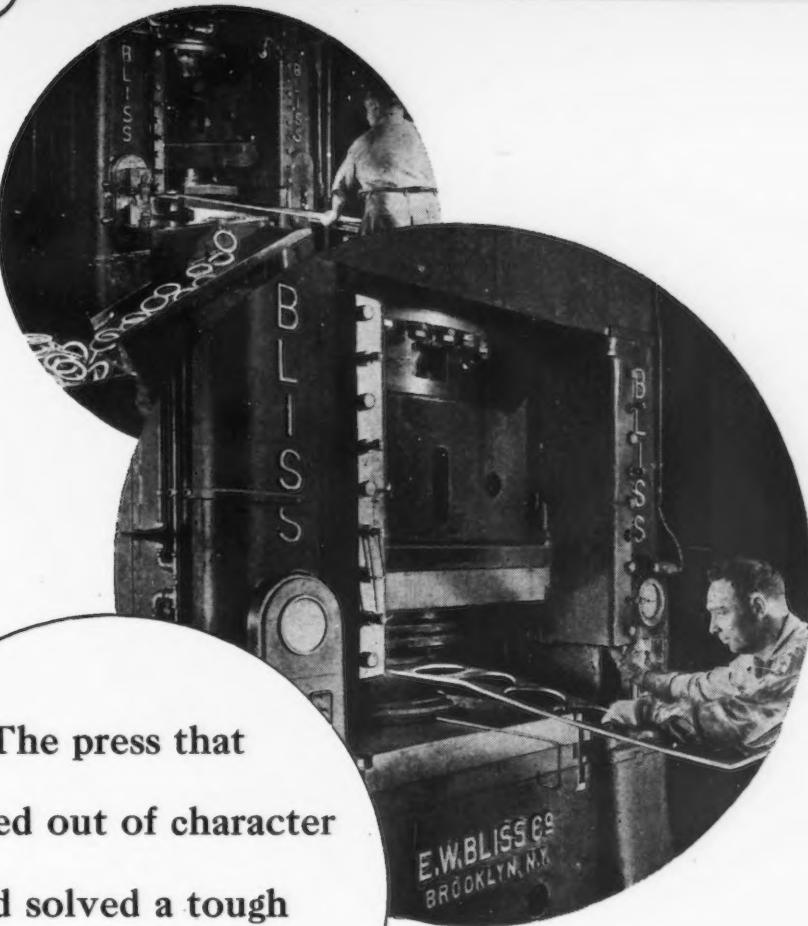
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The press that
stepped out of character
and solved a tough
production problem



Putting a press through paces other than its intended applications calls for the right combination of operator ingenuity plus press flexibility.

Goetze Gasket and Packing Company is supplying the operating "know-how" and this Bliss 750-ton Hydro-Dynamic Press is doing the rest. That's why you see this hydraulic press stepping out of character to blank cold 4,000 half-inch thick steel alloy rings daily where previous methods and equipment for blanking the rings hot involved a slower manufacturing cycle and very limited output.

"Naturally the press paid for itself in no time," we're told by Goetze's Plant Engineer. "Over and above its regular hydraulic pressing applications, it's the busiest press in the shop because it's so adaptable

for both long and short runs. During eight years of constant use, we've had very little maintenance to worry about. Considering that we feed as much as 50,000 pounds of heavy steel stock in a single day to produce these 10" diameter rings—it speaks well for the press' design and solid construction."

Such extra-utility is an added dividend that ninety years of press manufacturing builds into Bliss equipment of every type and size.

Bliss engineers are trained to survey your press needs, evaluate the applications you have in mind and recommend the right type of press—mechanical or hydraulic—solely on its engineering merits. Isn't this the kind of unbiased counsel you'd like brought to your problem?

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OF PRESSES THAN ANY OTHER COMPANY**

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NONFERROUS METALS

... News and Market Activities

WAA Asks Higher Price For Aluminum Plant

New York

• • • It is reported that the WAA is negotiating with Alcoa in order to obtain a somewhat higher price for the Massena, N. Y. aluminum reduction plant than the \$5 million offered in their bid. Alcoa is reported to have been the only bidder for the plant and had estimated that the placing of the plant in service would involve an additional \$3.5 million. The cost of this plant to the government for war production is reported to have been more than \$19 million. If the Alcoa bid, as negotiated, is acceptable to the WAA, a purchase would call for the approval of the Attorney General.

Copper

• • • Action on the suspension of the copper tariff is still tied up in the Senate Finance Committee which is reported to have recessed for the holiday to reconvene at midweek. The latest action taken was Wednesday a week ago when the vote on suspension for a year was six to six. Sentiment of the members seems to indicate the possibility of an 18 month period, although it is quite possible that the committee may decide to follow the House 2-year period.

A subcommittee of the House Committee on Public Lands has been holding hearings on HR-2455 proposed by Representative Charles H. Russell of Nevada. This bill which is designated as the National Minerals and Conservation Act of 1947, is not entirely an extension of the Premium Payment Plan. However it

does provide for payments where necessary to keep mines operating.

Raises Spiegeleisen Price

Pittsburgh

• • • Carnegie-Illinois Steel Corp. has announced an increase of price on spiegeleisen to \$48 a ton, Pittsburgh, on material from 19 to 21 pct Mn, and \$47 a ton on spiegel 16 to 19 Mn.

This action follows an increase of \$4 a ton taken by the New Jersey Zinc Co. recently.

U. S. Tin Price Rises

Washington

• • • Price of government-held tin has been increased from 70 to 80¢ per lb, effective immediately the Reconstruction Finance Corp. has announced. The new price will continue in effect throughout the month of April and thereafter until changed.

Declining world supplies have reduced government stocks to little more than 40,000 tons; CPA figures on total available supplies of new tin were recently revised downward to 69,000 tons.

Antimony

• • • National Lead Co. is reported to be in the process of placing into operation some of the older equipment at Laredo, Tex. in order to handle the larger tonnage of antimony ore which is being imported from Mexico as the result of the higher prices now prevailing. Consumer demand at these prices has not been significantly reduced and the producer

has reported some difficulty in accommodating demand for the metal. It is hoped that with the additional facilities there will be a better balance between supply and demand.

Raise Bronze Ingot Price

New York

• • • Reacting quickly to the government's announcement of a 10¢ per lb increase in tin, ingot producers have revised upwards their prices on tin-containing remelted brass and bronze. The principal increases appeared in the 88-10-2 type of ingots where two grades were advanced 2¢ per lb, and smaller increases announced for other grades. Lesser increases were announced in the 80-10-10 series in which increases ranged from 0.50¢ to 1.50¢ per lb.

Zinc Institute to Hear About Ore, Slab Supply

New York

• • • A preliminary program has just been released covering the Twenty-Ninth Annual Meeting of the Zinc Institute, to be held at the Hotel Statler, St. Louis, Mo., on Apr. 28 and 29.

On Monday, the slab zinc supply at home and abroad will be discussed by T. H. Miller, assistant director of the Bureau of Mines. There will be a review of the Washington situation by Julian D. Conover of the American Mining Congress. Specialists in each field will discuss the market outlook for zinc in all departments of use.

The next day, Colonel O. O. Niergarth, of the Army and Navy Munitions Board, will present the subject of "Stockpiling and Industrial Planning." George C. Heikes, of Mines, Inc., will discuss the zinc ore supply, domestic and foreign. Evan Just, Editor of *Engineering & Mining Journal*, will report on the position of the industry pro and con with respect to subsidies, and J. K. Richardson, of the Utah Mining Assn., will discuss "Safety and Health in the Zinc Industry."

Nonferrous Metals Prices

Cents per pound

	Apr. 2	Apr. 3	Apr. 4	Apr. 5	Apr. 7	Apr. 8
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	...	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex., 33.00	
Beryllium, copper, 3.75-4.25% Be; dollars per lb contained Be	\$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	\$27.50
Cadmium, del'd	\$1.75
Cobalt, 97-99% (per lb)	\$1.50 to \$1.57
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.9%, dollars per troy oz.	\$2.25
Iridium, dollars per troy oz.	\$110.00
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	\$86.50 to 88.00
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per troy oz.	\$58 to \$61
Silver, New York, cents per oz.	76.00
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	\$8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	21.50
No. 115	21.90
No. 120	20.50
No. 123	
80-10-10 ingot	25.25
No. 305	23.50
No. 315	
88-10-2 ingot	23.25
No. 210	
No. 215	27.25
No. 245	23.75
Yellow ingot	
No. 405	17.00
Manganese Bronze	
No. 421	19.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50
0.60 copper, max.	17.00
Piston alloys (No. 122 type)	15.50
No. 12 alum. (No. 2 grade)	14.75
108 alloy	15.00
195 alloy	15.75
AXS-679	15.25
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1-95 pct-97 1/2 pct	16.00
Grade 2-92 pct-95 pct	15.00
Grade 3-90 pct-92 pct	14.25
Grade 4-85 pct-90 pct	13.75

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	36%
Electrodeposited	31%
Rolled, oval, straight, delivered	32%
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33
Zinc, Cast, 99.99	18%
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz	88 1/4

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	40.50
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz	70%
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: 1/8 in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 52S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, 1/4 in., 29.5¢; 1/2 in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, 1/4 in., 35.5¢; 1/2 in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. Rod: 2S, 3S, 1 1/4 to 2 1/4 in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. Round Wire: drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma, FSA, 1/4 in., 54¢-56¢; 115, 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, \$1.25-\$1.31; 24, \$1.71-\$1.75.

Round Rod, Square and Hexagonal Bar: M, diam, in. 1/4 to 3/4, 55¢; 3/4 to 1/2, 52.5¢; 3/4 to 4 in. and over, 52¢. Other alloys higher.

Extruded Solid Shapes and Rectangles: M, form factors 1 to 4, 52¢; 8 to 10, 53.5¢; 14 to 16, 56.5¢; 20 to 22, 61¢; 26 to 28, 63¢. Other alloys higher.

Tubing: M, based on weight in pounds per lineal foot, 2 lb. and over, 55¢; 1 to 1.5, 58.5¢; 0.5 to 0.7, 64¢; 0.35 to 0.4, 69¢; 0.25 to 0.3, 73¢; 0.15 to 0.2, 81¢; 0.085 to 0.1, 96¢; 0.05 to 0.06, 31.14¢; 0.04 to 0.045, \$1.28. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

Nickel Monel

Sheets, cold-rolled	54	43
No. 35 sheets	41	
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	...	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	32.78	...	32.93
Copper, hot rolled	29.28	...	
Copper, drawn	30.28	...	
Low brass	39.13	30.32	30.63
High brass	37.38	28.57	28.88
Red brass	39.74	30.93	31.24
Naval brass	28.73	27.48	33.42
Brass, free cutting	27.23	23.64	...
Commercial bronze	40.86	32.05	32.36
Manganese bronze	32.28	30.78	36.92
Phosphor bronze, 5 pct.	51.00	50.75	
Muntz metal	28.42	27.17	31.61
Everdur, Herculoy			
Olympic, etc.	36.30	36.65	37.71
Nickel silver, 5 pct.	40.54	39.53	37.92
Architectural bronze	27.23	...	

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings 14%

Loose yellow brass trimmings 15%

Copper and Brass

No. 1 heavy copper and wire 17 — 17 1/2

No. 2 heavy copper and wire 16 — 16 1/2

Light copper 15 — 15 1/2

Auto radiators (unsweated) 10 1/2 — 11 1/2

No. 1 composition 14 1/2 — 15

No. 1 composition turnings 13 1/2 — 14

Clean red car boxes 12 — 12 1/2

Cocks and faucets 11 1/2 — 12

Mixed heavy yellow brass 9 1/2 — 10 1/2

Old rolled brass 9 1/2 — 10

Brass pipe 11 1/2 — 11 1/2

New soft brass clippings 13 — 13 1/2

Brass rod ends 12 1/2 — 12 1/2

No. 1 brass rod turnings 12 — 12 1/2

Aluminum

Alum. pistons with struts 4 1/2 — 5

Aluminum crankcases 6 1/2 — 7

2S aluminum clippings 8 — 8 1/2

Old sheet & utensils 6 1/2 — 6 1/2

Mixed borings and turnings 2 — 2 1/2

Misc. cast aluminum 6 — 6 1/2

Dural clips (24S) 5 1/2 — 6

Zinc

New zinc clippings 7 — 7 1/2

Old zinc 5 1/2 — 5 1/2

Zinc routings 3 — 3 1/2

Old die cast scrap 3 — 3 1/2

Nickel and Monel

Pure nickel clippings 22 — 23

Clean nickel turnings 17 — 18

Nickel anodes 19 1/2 — 20 1/2

Nickel rod ends 20 — 21

New Monel clippings 14 — 15

Clean Monel turnings 9 — 10

Old sheet Monel 12 — 12 1/2

Old Monel castings 10 — 11

Inconel clippings 10 — 11

German silver clippings, mixed 10 1/2 — 11

German silver turnings, mixed 7 — 7 1/2

Lead

Soft scrap lead 12 1/2 — 13

Battery plates (dry) 7 — 7 1/2

Miscellaneous

Block tin 60 — 68

No. 1 pewter 46 — 48

No. 1 auto babbitt 35 — 36

Mixed common babbitt 12 — 12 1/2

Solder joints 13 1/2 — 13 3/4

Siphon tops 38 — 39

Small foundry type 15 — 15 1/2

Monotype 13 1/2 — 14

Lino and stereotype 12 — 13

Electrotype 11 — 12

New type shell cuttings (nom) 13 — 13 1/2

Clean hand picked type shells 5 1/2 — 6

Lino and stereo dress 6 — 6 1/2

Electro dress 4 — 4 1/2

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect.

Freight equalized with nearest free delivery point.

Full lead sheets 18.25

Cut lead sheets 18.75

Lead pipe, manufacturing point 17.50

Lead traps and bends List +42%

Combination lead and iron bends and ferrules, also combination lead and iron ferrules List +42%

Lead wool 19.50

Prices Again Sag in All Major Markets

New York

• • • Price weakness swept through the nation's steel scrap markets this week. Declines included 50¢ at Pittsburgh, \$2.50 in Chicago and \$2.75 in Philadelphia and Detroit. Lower prices were posted in most steel grades in every major market. Purchases of material in areas well removed from mills' normal sources had evaporated — at least temporarily—as a market factor. Only cast grades showed fair firmness, although there were some advance signs of weakness there too, and a few slight dips were reported.

Early this week the scrap trade felt it too early to assay the effect of the shutdown and the "safety strike" in the coal mines, and communications difficulties were having their effect on trading. Many mills were still out of the market and some foundries were reported in a somewhat better position for cupola grades.

Shipments have continued excellent. In the face of declining prices many mills are insisting on suppliers living up to delivery promises and are notifying them that definite cancellation dates will be enforced.

PITTSBURGH—Communications tie up this week slowed the effect of changes in market conditions from outside the local area. There appears no immediate danger of the coal strike breaking scrap prices. As a matter of fact it appears that greater scrap consumption in the openhearth, because of curtailed iron output, may bolster the market. Fluctuations in the prices of railroad specialties result from new railroad list sales rather than a weakening of the market. Despite talk of softening prices, no sales at under the local \$38 a ton price have been made here and brokers do not anticipate any immediate drop in this price.

CHICAGO—Prices on openhearth scrap fell off on the average of \$2.50 a ton last week. Railroad specialties also declined but the decrease in price was not consistent in all items. The tonnage placed by the mills was not large but substantial enough to be representative of the new prices. Mills are still withholding large commitments until the market is further clarified. Broker and dealer prices continue to fluctuate depending on the specific contracts being filled.

PHILADELPHIA—According to people considered to be reliable, the scrap market here declined again last week and heavy melting grades were quoted at \$34 to \$35 delivered to the consumer. In the absence of significant mill purchases, the market is determined by brokers' and dealers' transactions. Cast grades continue relatively firm although there is evidence of a minor price drop in them by major consumers. Low phos grades have declined with heavy melting. Scrap volume on existing contracts is reported to be very heavy.

NEW YORK—Shipments were holding up very well over the past week in spite of a further price drop in heavy melting steel to \$31.25 to \$32.25 from last week's \$33 to \$34.25. Little new business was done early this week. Southern New Jersey foundries cut No. 1 cast buying prices by \$1 but on the whole cast scrap prices are still holding. Attempts to get chemical borings prices down \$5 were unsuccessful early in the week, and brokers were still paying \$29 to cover old orders.

DETROIT—While the Detroit market is definitely weaker again this week the difficulty in locating volume sales at the lower prices continues. At the moment one of the large buyers in this area is out of the market until Apr. 15, while another has already contracted for sufficient scrap to meet his April requirements. It is expected, however, that new contracts will be signed prior to Apr. 15 and possibly this week. Small purchases of low phos plate were reported this week and contracts for a substantial volume of industrial scrap were consummated. Cast grades, particularly heavy breakable, are also reported softer. Meanwhile, the most noteworthy aspect of the present market is the absence for the first time in several months of outside buyers and the scarcity of new orders.

CLEVELAND—Foundry grades continue strong, but the openhearth market is weak, with very little if any trading at current prices. Last week's big shipments put some consumers in position to cancel orders, but in most cases the scrap is coming in fast enough to beat the expiration dates. Most of the higher priced orders will be up on the 20th of this month, and at that time the drive for lower prices will probably reach its peak. One local mill has been refusing No. 1 steel at \$35 for May delivery, but a peculiar aspect of the present situation is that turnings have not yet shown any sign of weakness.

BOSTON—Mills are bidding; not buying. Brokers are still trying to cover old \$36 a ton orders, now at \$31, thus pocketing the difference. Best reported mill offer is \$29, or \$7 under 1947 peak; for other items \$5.50 to \$6.50 under 1947 ceilings. Brokers and mills have yet to come to terms on new business. Large

cast consumers with accumulations have withdrawn from market. Prices have not weakened, however. Greater Boston delivery market is still \$40 to \$45; where transportation costs are greater, \$47, \$48 and \$50 for strictly No. 1 machinery, which is in slightly larger supply.

BUFFALO—Bearishness dominated the local scene this week. One consumer followed cancellation of \$41 contracts for steel grades last week with new orders at \$37.25 but later turned down additional offerings at a dollar less. The same interest bought machine shop turnings at \$26 and shoveling at \$28. Niagara Falls furnaces are bidding \$25 for machine shop and business is expected at this price. Another local mill set an Apr. 15 deadline for tenders on \$41 contracts and meantime was out of the market. As a result most dealers looked on the market as a \$35 affair and far from firm. Demands for foundry scrap was reported good at previous prices.

ST. LOUIS—Instead of dropping \$2, the amount of the previous advance, heavy melting steel declined only \$1 here. The very slight easing was explained by activity of brokers covering orders due to expire within 10 days or 2 weeks. Mills talk of \$33 as their next buying price but have not yet placed orders. Car wheels are up \$2 due to scarcity; miscellaneous rails are off \$3 because foundries are well stocked.

CINCINNATI—With most consumers resisting offerings, prices are softer with some announced reductions this week. Embargo at one mill in the area tends further to weaken the present market. While scrap is flowing more freely, dealers and brokers indicate that with any appreciable increase in demand a tightening would be almost immediately noticeable. Cast grades appear to be fairly steady, the largest reduction in price being noticeable in the steel grades.

BIRMINGHAM—This district's largest consumer is out of the market and the \$33 quoted for heavy melting steel, the last price paid for substantial tonnages, is nominal. Another evidence of increased softness in the market here is a decline of \$3 per ton on rerolling rails. While holders of scrap are deluging consumers with offers of material, considerable tonnages are being barged up the Mississippi from New Orleans to northern points.

TORONTO—Canadian scrap iron and steel prices remain under governmental control with no indication that revisions are in prospect for the immediate future. Current prices went into effect in 1942. No improvement was reported in scrap supply during the week and dealers state that receipts have been further affected by the long Easter holiday weekend. No scrap is reaching dealers from outside points and only small lots from industrial plants with the result that these agencies are providing less than 10 pct of consumer requirements.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$38.00 to \$39.00
RR. hvy. melting	37.50 to 38.00
No. 2 hvy. melting	38.00 to 39.00
RR. scrap rails	42.00 to 43.00
Rails 2 ft. and under	46.00 to 47.00
No. 1 comp'd bundles	38.00 to 39.00
Hand bldd. new shts	38.00 to 39.00
Hvy. axle turn	37.00 to 37.50
Hvy. steel forge turn	37.00 to 37.50
Mach. shop turn	29.00 to 30.00
Short. shov. turn	31.00 to 32.00
Mixed bor. and turn	29.00 to 30.00
Cast iron borings	29.00 to 30.00
No. 1 cupola cast	45.50 to 46.50
Heavy breakable cast	38.00 to 39.00
Malleable	44.00 to 45.00
RR. knuck. and coup.	44.00 to 45.00
RR. coil springs	44.00 to 45.00
Rail leaf springs	44.00 to 45.00
Rolled steel wheels	44.00 to 45.00
Low phos	41.50 to 42.50

CHICAGO

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$33.00 to \$33.50
No. 2 hvy. melting	33.00 to 33.50
No. 1 bundles	33.00 to 33.50
No. 2 dealers' bundles	33.00 to 33.50
Bundled mach. shop turn	33.00 to 33.50
Galv. bundles	31.50 to 32.00
Mach. shop turn	28.50 to 29.00
Short shov. turn	30.50 to 31.00
Cast iron borings	29.50 to 30.00
Mix. borings & turn.	28.50 to 29.00
Los. phos. hvy. forge	38.50 to 39.00
Low phos. plates	36.00 to 36.50
No. 1 RR. hvy. melt.	34.00 to 34.50
Rerolling rails	40.00 to 41.00
Miscellaneous rails	38.50 to 39.00
Angles & spliced bars	40.50 to 41.00
Locomotive tires, cut	41.00 to 42.00
Cut bolster & side frames	38.00 to 38.50
Standard stl. car axles	38.50 to 39.00
No. 3 steel wheels	40.00 to 40.50
Couplers & knuckles	40.00 to 40.50
Malleable	44.00 to 45.00
No. 1 mach. cast	43.00 to 44.00
Rails 2 ft. and under	42.00 to 42.50
No. 1 agricul. cast	38.50 to 39.00
Hvy. breakable cast	35.00 to 36.00
RR. grate bars	38.50 to 39.00
Cast iron brake shoes	39.50 to 40.00
Cast iron carwheels	39.50 to 40.00

CINCINNATI

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$32.00 to \$33.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles	32.00 to 33.00
No. 2 bundles	32.00 to 33.00
Mach. shop turn	27.00 to 28.00
Shoveling turn	28.00 to 29.00
Cast iron borings	27.00 to 28.00
Mixed bor. & turn.	27.00 to 28.00
Low phos. plate	36.00 to 37.00
No. 1 cupola cast	45.00 to 47.00
Hvy. breakable cast	34.00 to 35.00
Scrap rails	38.00 to 39.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:	
No. 1 hvy. melting	\$29.00 to \$31.00
No. 2 hvy. melting	29.00 to 31.00
Nos. 1 and 2 bundles	29.00 to 31.00
Busheling	29.00 to 31.00
Turnings, shoveling	23.00
Machine shop turn	21.00
Mixed bor. & turn.	21.00
Cl'n cast. chem. bor.	23.00 to 28.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast	40.00 to 45.00
Heavy breakable cast	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:	
No. 1 hvy. melting	\$32.00 to \$32.50
No. 2 hvy. melting	32.00 to 32.50
No. 1 bundles	32.00 to 32.50
New busheling	32.00 to 32.50
Flashings	32.00 to 32.50
Mach. shop turn	26.00 to 26.50
Short shov. turn	27.00 to 27.50
Cast iron borings	27.00 to 27.50
Mixed bor. & turn.	26.00 to 26.50
Low phos. plate	34.00 to 34.50
No. 1 cupola cast	39.00 to 44.00
Hvy. breakable cast	35.00 to 37.00
Stove plate	37.00 to 39.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$34.00 to \$35.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	34.00 to 35.00
No. 2 bundles	34.00 to 35.00
Mach. shop turn	25.00 to 26.00
Shoveling turn	26.00 to 27.00
Mixed bor. & turn.	25.00 to 26.00
Cast iron borings	31.50 to 32.50
No. 1 cupola cast	48.00 to 50.00
Hvy. breakable cast	45.00 to 46.00
Cast. charging box	45.00 to 46.00
Clean auto cast	48.00 to 50.00
Hvy. axle forge turn	34.00 to 35.00
Low phos. plate	39.00 to 40.00
Low phos. punchings	39.00 to 40.00
Low phos. bundles	38.00 to 39.00
RR. steel wheels	42.50 to 43.50
RR. coil springs	42.50 to 43.50
RR. malleable	48.00 to 50.00

ST. LOUIS

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$34.50 to \$35.00
Bundled sheets	34.50 to 35.00
Mach. shop turn	28.00 to 29.00
Locomotive tires, uncut	37.00 to 38.00
Mis. std. sec. rails	37.00 to 38.00
Rerolling rails	39.00 to 40.00
Steel angle bars	40.00 to 41.00
Rails 3 ft. and under	42.00 to 44.00
RR. steel springs	39.00 to 40.00
Steel car axles	38.00 to 40.00
Stove plate	36.00 to 38.00
Grate bars	35.00 to 36.00
Brake shoes	35.00 to 36.00
Malleable	47.00 to 49.00
Cast iron car wheels	42.00 to 43.00
No. 1 machinery cast	40.00 to 41.00
Breakable cast	37.00 to 38.00

BIRMINGHAM

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$33.00
No. 2 hvy. melting	33.00
No. 1 bundles	33.00
Long turnings	23.00
Shoveling turnings	25.00
Cast iron borings	24.00
Bar crops and plate	36.00 to 37.00
Structural and plate	36.00 to 37.00
No. 1 cast	37.50 to 42.50
Stove plate	37.00 to 38.00
Steel axles	33.00
Scrap rails	33.00 to 34.00
Rerolling rails	36.00 to 37.00
Angles & splice bars	37.00 to 38.00
Rails 3 ft. and under	37.00 to 38.00
Cast iron carwheels	32.00 to 32.50

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$35.00 to \$36.00
No. 2 hvy. melting	35.00 to 36.00
Low phos. plate	40.00 to 41.00
Mach. shop turn	29.50 to 30.00
Short shov. turn	31.50 to 32.00
Cast iron borings	31.50 to 32.00
Elec. furnace punch	40.00 to 41.00

NEW YORK

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$31.25 to \$32.25
No. 2 hvy. melting	31.25 to 32.25
Comp. black bundles	31.25 to 32.25
Comp. galv. bundles	29.25 to 30.25
Mach. shop turn	21.00 to 21.75
Mixed bor. & turn.	21.00 to 21.75
Shoveling turn	22.00 to 22.75
No. 1 cupola cast	42.00 to 43.00
Hvy. breakable cast	40.00 to 42.00
Charging box cast	\$40.00 to \$42.00
Stove plate	40.00 to 42.00
Clean auto cast	40.00 to 42.00
Unstrip. motor blks.	39.00 to 41.00
Cl'n chem. cast bor.	29.00

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$37.25 to \$38.25
No. 2 hvy. melting	36.25 to 37.25
No. 1 bundles	36.25 to 37.25
No. 2 bundles	36.25 to 37.25
Mach. shop turn	25.00 to 26.00
Shoveling turn	27.00 to 28.00
Cast iron borings	25.00 to 26.00
Mixed bor. & turn.	25.00 to 26.00
No. 1 cupola cast	40.00 to 45.00
Low phos. plate	39.00 to 41.00
Scrap rails	32.00 to 35.00
Rails 3 ft. & under	40.00 to 43.00
RR. steel wheels	40.00 to 43.00
Cast iron carwheels	40.00 to 43.00
RR. coil & leaf spgs.	40.00 to 43.00
RR. knuckles & coup.	40.00 to 43.00
No. 1 busheling	37.50 to 41.00

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$35.00 to \$36.00
No. 2 hvy. melting	35.00 to 36.00
Compressed sheet stl.	35.00 to 36.00
Drop forge flashings	35.00 to 36.00
No. 2 bundles	35.00 to 36.00
Mach. shop turn	29.00 to 29.50
Short shovel	31.00 to 31.50
No. 1 busheling	37.00 to 37.50
Steel axle turn	37.00 to 37.50
Cast iron borings	31.00 to 31.50
Mixed bor. & turn.	31.00 to 31.50
No. 1 machinery cast	45.00 to 46.00
Malleable	45.00 to 46.00
Railroad cast	45.00 to 46.00
Railroad grade bars	40.00 to 42.00
Stove plate	40.00 to 43.00
RR. hvy. melting	35.00 to 36.00
Rails 3 ft. & under	48.00 to 49.00
Rails 18 in. & under	48.00 to 49.00
Elec. furnace punch	40.00 to 40.50

SAN FRANCISCO

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$19.50
No. 2 hvy. melting	19.50
No. 3 bales	19.50
Mach. shop turn	13.00
Elec. furn. 1 ft. und.	25.00
No. 1 cupola cast	\$32.00 to 32.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn	14.50
No. 1 cupola cast	\$35.00 to 36.00
RR. hvy. melting	20.50

Comparison of Prices . . .

Advances over past week in **Heavy Type**, declines in **Italics**. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(cents per pound)	1947	1947	1947	1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
*24 ga				

Tin and Terneplate:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(dollars per base box)	1947	1947	1947	1946
Tinplate, standard cokes.	\$5.75	\$5.75	\$5.75	\$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. terne	4.90	4.90	4.90	4.30

Bars and Shapes:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(cents per pound)	1947	1947	1947	1946
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	24.00
Wrought iron bars	6.15	6.15	6.15	4.76

Wire and Wire Products:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(cents per pound)	1947	1947	1947	1946
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.25

Rails:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(dollars per 100 lb)	1947	1947	1947	1946
Heavy rails	\$2.50	\$2.50	\$2.50	\$43.89*
Light rails	2.85	2.85	2.85	49.18*

*per net ton

Semifinished Steel:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(dollars per gross ton)	1947	1947	1947	1946
Rerolling billets	\$42.00	\$42.00	\$42.00	\$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43

Wire Rods and Skelp:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(cents per pound)	1947	1947	1947	1946
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per gross ton)	1947	1947	1947	1946
No. 2, foundry, Phila.	\$36.51	\$36.51	\$36.51	\$28.34
No. 2, Valley furnace	33.50	33.50	33.50	26.50
No. 2, Southern, Cin'ti.	34.75	34.75	34.75	26.94
No. 2, Birmingham.	29.88	29.88	29.88	22.88
No. 2, foundry, Chicago.	33.00	33.00	33.00	26.50
Basic, del'd eastern Pa.	36.92	36.92	36.92	27.84
Basic, Valley furnace.	33.00	33.00	33.00	26.00
Malleable, Chicago.	33.50	33.50	33.50	26.50
Malleable, Valley.	33.50	33.50	33.50	26.50
Charcoal, Chicago.	45.99	45.99	45.99	42.34
Charcoal, Valley.	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is \$1 per ton.

‡ For carlots at seaboard.

Scrap:

Scrap:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per gross ton)	1947	1947	1947	1946
Heavy melt'g steel, P'gh.	\$38.50	\$39.00	\$39.50	\$20.00
Heavy melt'g steel, Phila.	34.50	37.25	39.50	18.75
Heavy melt'g steel, Ch'go.	33.25	35.75	37.25	18.75
No. 1, hy. comp. sheet, Det.	32.25	35.00	35.00	17.32
Low phos. plate, Youngs'n.	40.50	41.75	43.50	22.50
No. 1, cast, Pittsburgh.	46.00	45.00	41.50	20.00
No. 1, cast, Philadelphia.	49.00	50.00	49.00	20.00
No. 1, cast, Chicago.	43.50	46.50	44.25	20.00

Coke, Connellsville:

Coke, Connellsville:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per net ton at oven)	1947	1947	1947	1946
Furnace coke, prompt.	\$9.00	\$9.00	\$9.00	\$7.50
Foundry coke, prompt.	10.25	10.25	10.25	9.00

Nonferrous Metals:

Nonferrous Metals:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(cents per pound to large buyers)	1947	1947	1947	1946
Copper, electro., Conn.	21.50	21.50	21.50	12.00
Copper, Lake, Conn.	21.625	21.625	21.625	12.00
Tin, Straits, New York.	80.00	80.00	70.00	52.00
Zinc, East St. Louis.	10.50	10.50	10.50	8.25
Lead, St. Louis.	14.80	14.80	14.80	6.35
Aluminum, virgin.	15.00	15.00	15.00	15.00
Nickel, electrolytic.	37.67	37.67	37.67	35.00
Magnesium, ingot.	20.50	20.50	20.50	26.50
Antimony, Laredo, Tex.	33.00	33.00	28.25	14.50

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

PIG IRON

Pig Iron:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per gross ton)	1947	1947	1947	1946
\$33.15 per gross ton.
\$33.15 per gross ton.
\$33.15 per gross ton.
\$26.12 per gross ton.

Pig Iron:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per gross ton)	1947	1947	1947	1946
\$39.67 Mar. 18	\$31.00	Jan. 7	7	7
31.17 Dec. 24	19.17	Jan. 1	1	1
19.17 Jan. 2	18.92	May 22	22	22
19.17 Jan. 11	15.76	Oct. 24	24	24
\$19.17	\$19.17			

Pig Iron:	Apr. 8	Apr. 1	Mar. 11	Apr. 9
(per gross ton)	1947	1947	1947	1946
\$22.00 Jan. 7	\$19.17	Apr. 10	10	8
21.83 Dec. 30	16.04	Apr. 9	9	8
22.50 Oct. 3	14.08	May 16	16	15
15.00 Nov. 22	11.00	June 7	7	6
21.92 Mar. 30	12.67	June 9	9	8
17.75 Dec. 21	12.67	June 8	8	7
13.42 Dec. 10	10.33	Apr. 29	29	28
13.00 Mar. 13	9.50	Sept. 25	25	24
12.25 Aug. 8	6.75	Jan. 3	3	2
8.50 Jan. 12	6.43	July 5	5	4
11.33 Jan. 6	8.50	Dec. 29	29	28
15.00 Feb. 18	11.25	Dec. 9	9	8
17.58 Jan. 29	14.08	Dec. 8	8	7

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



For Durable, Weight-Saving Parts

USE J&L ELECTRICWELD TUBING

Improvement in service and appearance of many parts without increasing their weight is possible with J&L Electricweld Tubing. It is made of J&L Controlled Quality Steel—has the strength and surface finish that fits readily

into plans for new and advanced machines and equipment. It can be readily cut, welded, bent, upset, swaged, or formed—is used successfully in many manufacturing and assembly operations. Write for information today.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PENNSYLVANIA

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb. to 89,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wire, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6 (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices; includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by $\frac{3}{4}$ to $3\frac{1}{2}$ in. wide. (16) Some producers are charging 2.75c. (17) Delivered Los Angeles; add $\frac{1}{2}$ c per 100 lb for San Francisco. (18) Delivered Los Angeles only.

Basing Points	Pitts- burgh	Chicago	Gary	Clev- eland	Bir- mingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	San Fran'co, Los Angeles, Seattle	DELIVERED TO		
												Detroit	New York	Phil- adel- phia
INGOTS Carbon, rerolling														
Carbon, forging	\$40.00	\$40.90	\$40.00	\$40.00	\$40.00	\$40.00	\$40.00							
Alloy	\$52.00													
(\$35.00 f. o. b. mill)														
BILLETS, BLOOMS, SLABS														
Carbon, rerolling	\$42.00	\$42.00	\$42.00	\$42.00	\$42.00	\$42.00	\$42.00							
Carbon, forging billets	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00							
Alloy	\$61.00	\$61.00				\$61.00								
(Provo = \$53.20) (Provo = \$61.20, Duluth = \$52.00 ¹²) (Bethlehem, Massillon, Canton = \$61.00)														
SHEET BARS														
PIPE SKELP	2.35¢	2.35¢												
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢									
(Worcester = 2.65¢)														
SHEETS														
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.65¢	2.70¢	2.70¢
Cold-rolled ¹	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.35¢	3.41¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.55¢	3.55¢	3.55¢	4.32¢ ¹⁷	3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.55¢			3.70¢	3.85¢	3.93¢
Long ternes ² (10 gage)	3.55¢	3.55¢	3.55¢									3.95¢	3.91¢	
STRIP														
Hot-rolled ³	2.50¢	2.50¢	2.50¢	2.50¢ ¹⁸	2.50¢		2.50¢					2.65¢	2.93¢	2.88¢
Cold-rolled ⁴	3.20¢	3.30¢		3.20¢			3.20¢					3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢					3.08¢		
TINPLATE														
Standard cokes, base box	\$5.75	\$5.75	\$5.75		\$5.85				\$5.85	\$5.85		(Warren, Ohio = \$5.75)	\$5.157	\$6.062 ²¹
Electro, box ⁵ { 0.25 lb. 0.50 lb. 0.75 lb.												Deduct 90¢ from standard coke base box price. Deduct 70¢ from standard coke base box price. Deduct 50¢ from standard coke base box price.		
BLACKPLATE, 29 gage ⁵	3.60¢	3.60¢	3.60¢		3.70¢				3.70¢	3.70¢		(Warren, Ohio = \$5.75)	3.98¢	3.98¢
BLACKPLATE, CANMAKING														
55 lb. to 70 lb.												Deduct \$1.55 from standard coke base box.		
75 lb. to 95 lb.												Deduct \$1.65 from standard coke base box.		
100 lb. to 118 lb.												Deduct \$1.55 from standard coke base box.		
TERNES, MFG., Special coated												Deduct 85¢ from standard coke base box price.		
BARS														
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢
Rail steel ^{6, 16}	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢							
Reinforcing (billet) ⁷	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢			2.985¢	2.74¢	2.65¢
Reinforcing (rail) ^{7, 16}	2.80¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢							
Cold-finished ⁸	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢	3.20¢						3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢						3.20¢	3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢	3.80¢	3.80¢	3.80¢						3.95¢	
PLATE														
Carbon steel ¹²	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢						2.87¢	2.88¢
Floor plates	3.90¢	3.90¢											4.30¢	4.28¢
Alloy	3.79¢	3.79¢											4.01¢	3.895¢
SHAPES, Structural	2.50¢	2.50¢	2.50¢			2.50¢	2.50¢	(Geneva, Utah = 2.65¢) (Bethlehem = 2.50¢)				3.17¢ ¹⁸	2.70¢	2.64¢
SPRING STEEL, C-R														
0.26 to 0.40 carbon	3.20¢				3.20¢									
0.41 to 0.60 carbon	4.70¢				4.70¢									
0.61 to 0.80 carbon	5.30¢				5.30¢									
0.81 to 1.00 carbon	6.80¢				6.80¢									
Over 1.00 carbon	9.10¢				9.10¢									
MANUFACTURERS' WIRE ⁹														
Bright ¹⁰	3.30¢	3.30¢			3.30¢	3.30¢						5.63¢ ¹³	3.71¢	3.68¢
Galvanized														
Spring (high carbon)	4.25¢	4.25¢			4.25¢									
PILING, Steel sheet	3.00¢	3.00¢						3.00¢					3.41¢	3.36¢
Add proper size extra and galvanizing extra to Bright Wire Base														

PRICES

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 448
Ingot, Pgh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.			Subject to negotiation		Subject to negotiation	
Blooms, Pgh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, Pgh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, Pgh, Chi, Canton, Watervliet, Syracuse, Balt.			Subject to negotiation		Subject to negotiation	
Billets, forging, Pgh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville.	23.00	22.50	17.50	17.50	21.00	25.50
Bar, h-r, Pgh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville.	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, Pgh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet.	27.50	26.00	20.50	21.00	24.50	30.00
Plates, Pgh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, Pgh, Chi.	27.50	26.00	20.50	21.00	24.50	30.00
Sh.ots, Pgh, Chi, Middletown, Canton, Balt.	39.00	37.00	29.00	31.50	35.50	39.50
Sur. h-r, Pgh, Chi, Reading, Canton, Youngstown.	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, Pgh, Cleve, Newark, N. J., Reading, Canton, Youngstown.	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, Pgh, Newark, N. J. Phila., Ft. Wayne.	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton.	32.48	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse.	27.05	25.87	20.02	20.56	24.34	29.75
Tubing, seamless, Pgh, Chi, Canton, (4 to 6 in.)	72.09	72.09	68.49	....	....	....

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)

	W	Cr	V	Mo	Base per Pounds
18	4	1	—	—	74¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢
High-carbon-chromium*					47¢
Oil hardening manganese*					26¢
Special carbon*					24¢
Extra carbon*					20¢
Regular carbon*					16¢
Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.					

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.70¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

20x14 in. 20x28 in.

8-lb coating I.C.... \$6.75 \$13.50

CLAD STEEL

Base prices, cents per pound

	Stainless-clad	Plate Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville..	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville..	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	9.00	....

*Includes annealing and pickling.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

Base Delivered per San keg Francisco

Standard, galvanized and coated nails \$3.75† \$4.83

Cut nails, carloads, Pittsburgh base 5.30 ...

†10¢ additional at Cleveland, 30¢ at Worcester.

Base per 100 lb

Annealed fence wire \$3.95† \$4.96

Annealed galv. fence wire 4.40† 5.41

†10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

Base column

Woven wire fence* 84 107

Fence posts, carloads 90†† 110

Single loop bale ties 86 110

Galvanized barbed wire** 94 114

Twisted barbless wire 94 ...

* 15 1/2 gage and heavier. ** On 80-rod spools in carload quantities. †† Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otiscoloy	Yoloy	Y-50	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill	Great Lakes Steel
Plates.....	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	....	4.10
Sheets										
Hot-rolled...	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	5.225*	3.75
Cold-rolled...	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	6.00*	4.55†
Galvanized...	5.40	5.40	....	....	5.40	....	....	....	....	....
Strip										
Hot-rolled...	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled...	....	....	4.75	....	....	4.75	4.75	4.75	6.00*	4.55†
Shapes.....	....	3.85	....	....	3.85	3.85	3.85	3.85	....	....
Beams.....	....	3.85	....	....	....	3.85	....	....	....	....
Bars										
Hot-rolled...	4.00	4.00	4.00	....	....	4.00	4.00	4.00	....	4.00
Cold-rolled...	....	....	....	....	....	....	....	4.60	....	....
Bar shapes.....	....	4.00	....	....	4.00	4.00	4.00	4.00	....	....

* 21 gage and lighter. † Pittsburgh, add 0.10¢ at Chicago and Gary.

PRICES

PIPE AND TUBING

Base discounts. F.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, \$200.00 per net ton

Standard, threaded & coupled

	Black	Galv.
1/2-in.	55 1/2	41
5/8-in.	58 1/2	45
1 to 3-in.	60 1/2	47 1/2
Wrought Iron, buttweld		
1/2-in.	2	+20
5/8-in.	11 1/2	+10
1 and 1/4-in.	17	+2
1 1/4-in.	22 1/2	1 1/2
2-in.	23	2
Steel, lapweld		
2-in.	53	39 1/2
2 1/2 and 3-in.	56	42 1/2
3 1/2 to 6-in.	58	44 1/2
Steel, seamless		
2-in.	52	38 1/2
2 1/2 and 3-in.	55	41 1/2
3 1/2 to 6-in.	57	43 1/2
Wrought Iron, lapweld		
2-in.	14 1/2	+ 5 1/2
2 1/2 to 3 1/2-in.	17	+ 1 1/2
4-in.	21	4
4 1/2 to 8-in.	19	2 1/2

Extra Strong, plain ends

	Black	Galv.
1/2-in.	54 1/2	41 1/2
5/8-in.	58 1/2	45 1/2
1 to 3-in.	60	48
Wrought Iron, buttweld		
1/2-in.	6 1/2	+14
5/8-in.	12 1/2	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39 1/2
2 1/2 and 3-in.	56	43 1/2
3 1/2 to 6-in.	59 1/2	47
Steel, seamless		
2-in.	51	38 1/2
2 1/2 and 3-in.	55	42 1/2
3 1/2 to 6-in.	58 1/2	46
Wrought Iron, lapweld		
2-in.	17 1/2	+ 2
2 1/2 to 4-in.	26	8 1/2
4 1/2 to 6-in.	22	4

Base discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3 1/2-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

O.D. Gage	Seamless	Electric Weld	Hot-Drawn	Hot-Drawn
in. BWG	Rolled	Cold-Drawn	Rolled	Drawn
2	13	\$15.29	\$18.17	\$15.00
2 1/2	12	20.57	24.43	20.11
3	12	22.87	27.18	22.26
3 1/2	11	28.86	34.30	28.06
4	10	35.82	42.55	34.78
				41.68

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago	\$81.56
6-in. to 24-in. del'd New York	79.80
6-in. to 24-in., Birmingham	71.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	95.00
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
1/2 in. & smaller x 6 in. & shorter	.55
9/16 & 5/8 in. x 6 in. & shorter	.52
5/8 in. x 6 in. & shorter	.49
1 1/8 in. and larger, all lengths	.48
Lag, all diam over 6 in. long	.48
Lag, all diam x 6 in. & shorter	.50
Plow bolts	.57

Nuts, Cold Punched or Hot Pressed (Hexagon or Square)

	Percent Off List
1/4 in. and smaller	.48
9/16 to 1 in. inclusive	.47
1 1/8 to 1 1/2 in. inclusive	.45
1 1/2 in. and larger	.44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts U.S.S. S.A.E.

Base discount less case lots

	Percent Off List
7/16 in. and smaller	.51
1/2 in. and smaller	.48
1/2 in. through 1 in.	.48
9/16 in. through 1 1/2 in.	.47
1 1/2 in. and larger	.46

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Consumer

Packages, nuts separate 60 and 10 in bulk 74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (1/2 in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham \$5.25

F.o.b. Lebanon, Pa. 5.40

Small Rivets (7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55 and 5

Cap and Set Screws (In packages)

Percent Off List

Consumer

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.

Set screws, cup and oval points 56

Milled studs 61

Flat head cap screws, listed sizes 33

Fillister head cap, listed sizes 21

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF₂ Content: short ton

70% or more \$33.00

65% but less than 70% 32.00

60% but less than 65% 31.00

Less than 60% 30.00

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh 23¢ to 27¢

Copper, electrolytic, 100 and 325 mesh 30¢ to 31 1/4¢

Copper, reduced, 150 and 200 mesh 29¢ to 30 1/4¢

Iron, commercial, 100, 200, 325, mesh 96 + % Fe. 11¢ to 16¢

Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags 7.4¢ to 8¢

Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots 5¢

Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots 66¢

Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe. 25¢ to 31¢

Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe 17¢

Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe \$1.75

Aluminum, 100, 200 mesh, car lots 23¢ to 26¢

Antimony, 100 mesh 36.05¢

Cadmium, 100 mesh \$2.00

Chromium, 100 mesh and finer \$1.025

Lead, 100, 200 & 300 mesh 18.50¢ to 23.50¢

Manganese, minus 325 mesh and coarser 33¢

Nickel, 150 mesh 51 1/2¢

Silicon, 100 mesh 18.15¢

Solder powder, 100 mesh 8 1/4¢ plus metal

Tin, 100 mesh 86.75¢

Tungsten metal powder, 98-99%, any quantity, per lb. \$2.80

Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb. \$2.65

Under 100 lb \$2.90

COKE

Furnace, beehive (f.o.b. oven) Net Ton

Connellsville, Pa. \$8.75 to \$9.25

Foundry, beehive (f.o.b. oven) Connellsville, Pa. 10.00 to 10.50

Foundry, Byproduct

Chicago, del'd \$16.10

Chicago, f.o.b. 15.10

New England, del'd 17.25

Seaboard, Kearny, N. J., f.o.b. 15.35

Philadelphia, del'd 15.46

Buffalo, del'd 16.14

Ashland, Ohio, f.o.b. 13.35

Painesville, Ohio, f.o.b. 14.60

Erie, del'd 15.75

Cleveland, del'd 15.90

Cincinnati, del'd 15.39

St. Louis, del'd 15.85

Birmingham, del'd 12.35

REFRactories

(F.o.b. Works)

Fire Clay Brick Carloads, Per 1000

First quality, Ohio 57.00

First quality, Pa., Md., Ky., Mo. 65.00

First quality, New Jersey 70.00

Sec. quality, Pa., Md., Ky., Mo. 59.00

Sec. quality, New Jersey 62.00

Sec. quality, Ohio 51.00

Ground fire clay, net ton, bulk. 9.50

Silica Brick

Pennsylvania and Birmingham 86.00

Chicago District 74.00

Silica cement, net ton (Eastern) 11.50

Chicago 12.50

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester \$59.00

Magnesite Brick

Standard, Balt. and Chester \$81.00

Chemically bonded, Baltimore 70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester \$44.50

Domestic, f.o.b. Chewelah, Wash. 24.00

in bulk 28.00

Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa. 10.05

Midwest, add 10¢; Mo. Valley, add 20¢

PRICES

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Hot-Rolled	Cold-Finished	Hot-Rolled A 4615 As-rolled	Hot-Rolled A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	\$4.24	\$5.18	\$5.29	\$4.43	\$5.28	\$4.54	\$4.22	\$4.48	\$5.38	\$8.37	\$8.37	\$9.88
New York	4.42	5.17 ¹	5.47	4.62	5.40	4.72	4.37	4.62	5.42	8.42	8.42	9.92
Boston	4.50	5.12 ¹²	5.55 ¹²	4.65	6.356	4.80	4.47	4.62	5.468	8.62	8.62	9.97
Baltimore	4.09	5.14	4.40	.....	.....	4.39	4.34	4.45	5.35	.....	.....	.....
Norfolk	4.35	.....	.....	.....	.....	4.50	4.50	4.75	5.50	.....	.....	.....
Chicago	.....	.....	.....	5.90	.....	.....	.....	.....	4.95	8.10	8.10	9.35
Milwaukee	4.199	4.799	5.249	4.199	.....	4.499	4.249	4.249	5.149	8.399	8.399	9.649
Cleveland	4.00	4.60	5.238	4.188	4.95	4.30 ¹	4.311	4.05	4.95	8.358	8.358	9.35
Buffalo	4.00	4.60	5.35	4.30	5.25	4.65	4.05	4.05	4.95	8.10	8.10	9.35
Detroit	4.15	4.75	5.42	4.34	5.24	4.59 ¹	4.42	4.20	5.12	8.51	8.51	9.74
Cincinnati	4.116	4.716	5.166	.....	.....	4.803	4.444	4.403	5.303	.....	.....	.....
St. Louis	4.199	4.799	5.424	4.199	5.424	4.499	4.249	4.249	5.324	8.574	8.574	9.824
Pittsburgh	4.00	4.60 ¹	5.05	4.00	4.95	4.30	4.05	4.05	4.95	8.10	8.10	9.35
St. Paul	4.384 ⁷	5.034 ¹	5.434 ²	4.404 ⁷	.....	4.684 ⁷	4.434 ⁷	4.434 ⁷	5.726 ⁸	10.084 ⁶	.....	11.726 ⁶
Duluth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Omaha	4.868	6.618 ¹	5.918	4.868	.....	5.168	4.918	4.918	5.818	.....	.....	.....
Indianapolis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Birmingham	3.851 ¹¹	.....	5.20	4.001 ¹¹	.....	4.301 ¹¹	4.051 ¹¹	4.051 ¹¹	5.83	.....	.....	.....
Memphis	4.47	.....	5.37	4.72	.....	4.92	4.67	4.67	5.78	.....	.....	.....
New Orleans	*4.461 ¹¹	5.771	.....	.....	.....	4.831 ¹¹	*4.6811	*4.7811	6.14	.....	.....	.....
Los Angeles	5.35	7.001	6.70	5.65	8.35 ⁵	5.20 ¹²	5.20 ¹²	5.10 ¹³	6.901 ⁴	9.651 ¹⁰	9.35	11.05
San Francisco	4.90 ⁸	6.30 ⁹	6.45	5.20 ⁸	.....	5.00 ⁸	4.90 ⁸	4.75 ⁸	7.00 ¹⁰	.....	.....	.....
Seattle	5.00	7.80	6.30	5.30 ⁴	.....	5.25 ⁴	4.95 ⁴	5.00 ⁴	7.10	.....	.....	.....
Portland	5.00 ³	.....	6.25 ⁹	5.50 ³	.....	5.40 ³	5.10 ³	5.10 ³	7.20	.....	9.30	.....
Salt Lake City	6.25	.....	7.71	6.50	.....	6.10	6.25	6.25	7.50 ¹⁰	.....	.....	.....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb;

strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb

and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 3749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to 1/4 in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Base	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	39.00	Boston	Everett	\$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Birdsboro	34.00	34.50	35.00	35.50	39.00	Boston	Birdsboro-Steelton	4.82	37.50	38.00	38.50	43.82	.....
Birmingham	29.38	29.88	.....	.....	.....	Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	42.50	.....
Buffalo	32.50	33.00	33.50	34.00	39.00	Brooklyn	Birdsboro	3.50	.....	.....	.....	.....	.....
Chicago	32.50	33.00	33.50	34.00	39.00	Cincinnati	Birmingham	4.87	34.25	34.75	.....	.....	.....
Duluth	33.00	33.50	34.00	34.50	39.00	Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	.....
Erie	32.50	33.00	33.50	34.00	39.00	Jersey City	Birdsboro	2.33	35.84	36.34	36.84	41.33	.....
Everett	29.00	29.50	30.00	30.50	39.00	Los Angeles	Provo	5.94	38.94	39.44	39.44	.....	.....
Granite City	32.50	33.50	33.50	33.50	39.00	Manfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	.....
Neville Island	33.00	33.50	33.50	34.00	39.00	Philadelphia	Swedenland	1.01	36.01	36.51	37.01	37.51	.....
Provo	33.00	33.50	33.50	34.00	39.00	Philadelphia	Birdsboro	1.49	.....	.....	.....	40.49	.....
Sharpsville	33.00	33.50	33.50	34.00	39.00	San Francisco	Provo	5.94	38.94	39.44	39.44	.....	.....
Steetton	34.00	34.50	35.00	35.50	39.00	Seattle	Provo	5.94	38.94	39.44	39.44	.....	.....
Swedenland	37.50	35.50	36.00	36.50	39.00	St. Louis	Granite City	0.75 Arb.	33.25	34.25	34.25	34.25	.....
Toledo	32.50	33.00	33.50	34.00	39.00								.....
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00								.....
Youngstown ¹	32.50	33.00	33.00	33.50	39.00								.....

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous \$40.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, \$45.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. \$2 per ton extra may be charged for 0.5

to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—\$40.50; f.o.b. Buffalo—\$41.75. Add \$1.00 per ton for each additional 0.50 pct Si, up to 1.2 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are \$1.00 per ton above silvery iron prices of comparable analysis.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.	Carload lots (bulk)	135.00	Eastern	Central	Western
Less ton lots (packed)	148.50				
F.o.b. Pittsburgh	139.50				
\$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.					
Briquettes—cents per pound of briquet, freight allowed, 66% contained Mn.					
Eastern	Central	Western			
Carload, bulk .. 6.40	6.65	7.20			
Ton lots .. 7.30	7.90	9.30			
Less ton lots .. 7.70	8.30	10.20			

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerston, Pa.	16-19% Mn	19-21% Mn	Eastern	Central	Western
3% max. Si	3% max. Si				
Carloads	\$43.00	\$44.00			
F.o.b. Pittsburgh	47.00	48.00			

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.					
96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.					
Carload, bulk	30				
L.c.l. lots	32				

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.	Carloads	32	Eastern	Central	Western
Ton lots	34				
Less ton lots	36				

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.	Carloads	Ton	Less	Eastern	Central	Western
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65			
0.10% max. C	20.50	20.90	21.15			
0.15% max. C	20.00	20.40	20.65			
0.30% max. C	19.50	19.90	20.15			
0.50% max. C	19.00	19.40	19.65			
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65			

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.	Carload, bulk	6.45	Eastern	Central	Western
Ton lots	7.10				
Briquet, contract basis, carloads, bulk freight allowed, per lb of briquet	6.15				
Ton lots	7.05				
Less ton lots	7.45				

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, \$56.00 f.o.b. Keokuk, Iowa; \$52.75 f.o.b. Jackson, Ohio; \$54.00 f.o.b. Niagara Falls. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.	Eastern	Central	Western
9.6% Si, 2% Fe..	14.65	16.90	18.65
9.7% Si, 1% Fe..	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb briquets.	Eastern	Central	Western
Carload, bulk .. 3.85	4.10	4.30	
Ton lots .. 4.75	5.35	5.65	
Less ton lots .. 5.15	5.75	6.05	

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.	Eastern	Central	Western
25% Si	11.65		
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.	Eastern	Central	Western
0.06% Cr	23.00	23.40	24.00
0.10% Cr	22.50	22.90	23.50
0.15% Cr	22.00	22.40	23.00
0.20% Cr	21.50	21.90	22.50
0.50% Cr	21.00	21.40	22.00
1.00% Cr	20.50	20.90	21.50
2.00% Cr	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr, 4-6% C	16.60	17.00	17.15
6-9% Cr, 3% max. Si			

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.	Eastern	Central	Western
30-35% Cr, 60-65% Si, 3.00% max. Fe or 28-32% Cr, 60.65% Si, 6.00% max. Fe.			
Eastern	Central	Western	
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Silicon

Contract price per lb of alloy, f.o.b. shipping point, freight allowed.	Eastern	Central	Western
30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60.65% Si, 6.00% max. Fe.			
Eastern	Central	Western	
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Cast Turnings Distilled

Ton lots	\$1.60	\$2.35	\$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.	Eastern	Central	Western
Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.			
Eastern	Central	Western	
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30
Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.			
Eastern	Central	Western	
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.	Eastern	Central	Western
60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.			
Eastern	Central	Western	
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or 1/4 x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained V.	Eastern	Central	Western
1.5 ton lots, freight allowed	\$3.00		
1.5 ton lots			
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowed, per pound contained V.			
Openhearth	\$2.70		
Crucible	\$2.80		
High speed steel (Primos)	\$2.90		
Vanadium pentoxide, 8			

Says West Coast Firms Should Be Thinking Of Latin American Markets

Los Angeles

• • • West Coast industry should be thinking not only about the Orient but should give more careful attention to the Latin American markets where \$4 billion is waiting to be spent, according to George L. Bell, Associate Director of the Office of International Trade, Washington. Mr. Bell conducted a 2-day meeting with 50 leading manufacturers, importers, exporters, and bankers from 5 Western states, who comprise the West Coast Foreign Trade Advisory Committee to the U. S. Department of Commerce. At this meeting, the first of its kind ever held here, they discussed means of re-establishing world sources of trade information and the opening of new channels through war-entangled foreign governmental restrictions.

In Latin American countries it was pointed out that conditions are especially favorable for our capital goods industries, for the governments are putting tight controls on dollar exchange and discouraging the import of luxury goods. The governments want producers' goods to build up their own production with such items as heavy machinery, freight cars, locomotives, transport equipment, trucks and automobiles, and farm machinery and implements.

One manufacturer, Perfecold International Refrigeration Equipment Co., Los Angeles, producers of commercial laboratory refrigeration equipment, which, since the war, has again been selling to Ecuador, Chile, Colombia and Bolivia, mentioned difficulties in expanding trade. First are the shortages of rough castings and electrical motors and second, lack of dollar exchange in foreign countries. Ralph H. Linderman, export manager for the company, said that these countries have the money but they cannot trade it for U. S. dollars. Until our imports come into better balance with exports there won't be enough exchange to support a big world trade. He pleaded for the World Bank to be put into operation immediately so that foreign countries can have the dollar exchange they need: "I

think the country as a whole will benefit through increased employment. For example, refrigeration is a seasonal business in this country. Below the equator the seasons are exactly opposite to ours. This fact gives us a year-round market for our products. We don't have to lay off employees during part of the year. Foreign trade stabilizes our production."

Members of the West Coast Foreign Trade Advisory Committee asked that buyers of government war surpluses be automatically granted export licenses so that delays in getting shipping clearance could be cut down. They cited the difficulties encountered with foreign governments which are often slow to grant import licenses after our government has given permission to export.

For example, it is very difficult to obtain permission from the Chinese government to import coal in spite of that country's urgent need. Many foreign countries, members said, are still keeping control of imports and exports instead of reopening trade to private firms. Manufacturers complain that certain South American countries and the United Kingdom give an export license for only six months. Yet it often takes a year and a half

to schedule and build some types of special machinery.

Mr. Bell, who came expressly from Washington to confer with the group of business leaders, said that he hopes to see something concrete accomplished through the International Trade Organization, soon to meet in Geneva, Switzerland, which will result in the lowering of trade barriers, and especially in the abolition of the quota.

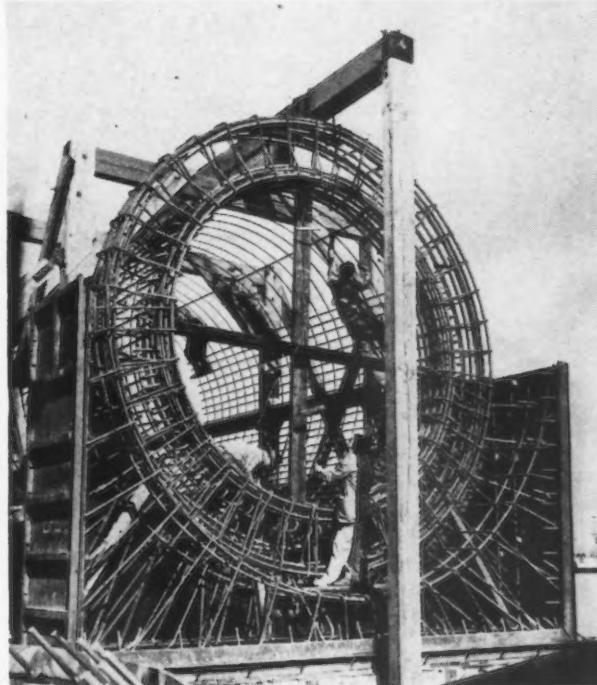
"You may overcome a high tariff by good salesmanship and superior quality of your product, but you cannot overcome an import quota. We should try to get mutual reductions and eliminations of quotas. During the war our population grew about 4 pct, but our productive capacity grew 50 pct. That means we will need all the markets we can find, so that we can continue at full production . . . and keep full employment," said Mr. Bell.

See Building Cost Peak

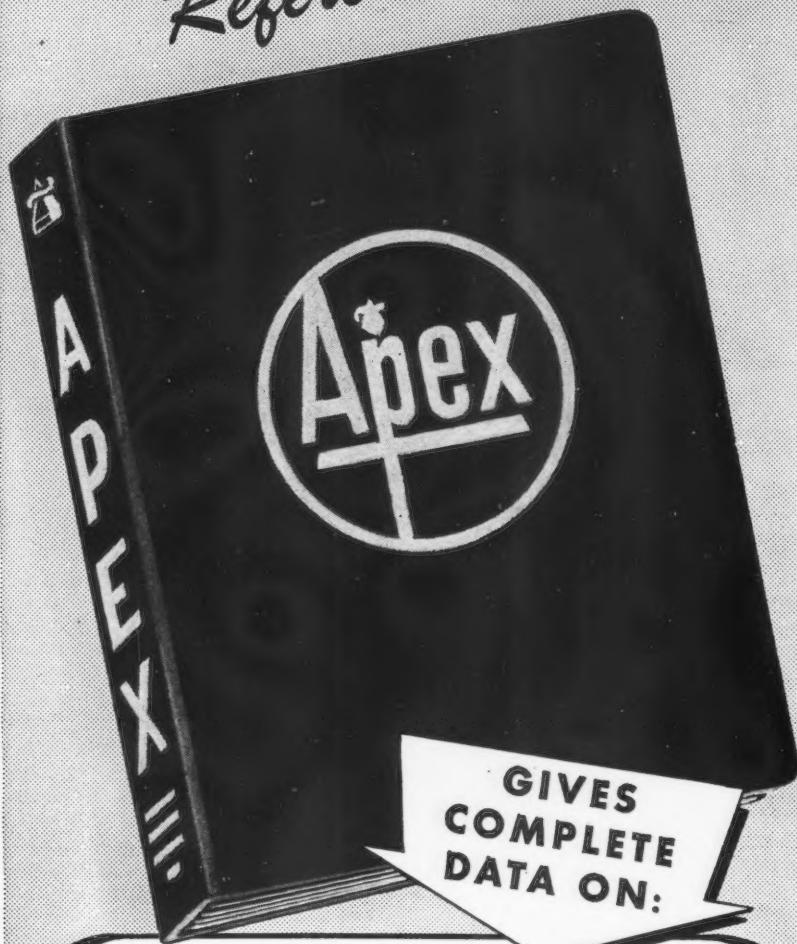
New York

• • • Fifty-three pct of 268 general contractors in all parts of the country polled by F. W. Dodge Corp., a fact-finding organization of the construction industry, believe that the peak in construction costs has been reached.

HEAVY HOLE:
To fabricate this
100-ft long sec-
tion of the Los
Angeles Hyper-
ion sewer proj-
ect required 22
tons of reinforc-
ing steel. This
is the bell end
of the section
which will be
part of the sub-
marine outfall of
the pipe, after
fabrication in the
Los Angeles
plant of Bethle-
hem Pacific Coast
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NEWS OF INDUSTRY

**Applications for Loans
 With World Bank Now
 Total Over \$2.3 Billion**

Washington

• • • Loan applications filed with the World Bank for purposes of reconstruction and the development of industrial facilities now total a little more than \$2.3 billion. Were these to be granted in their entirety, the Bank would have to raise an additional \$1.6 billion since its present resources amount to about \$721 million.

A review of the Bank's activities shows that one South American and seven European countries have requested loans for the general purposes for which the Bank was organized.

Formal requests for aid have been received from Chile, France, Czechoslovakia, Denmark, the Netherlands, Iran, Luxembourg and Poland. A ninth, Greece, has informed the Bank that a request will be filed in the near future. The amounts sought and the purposes are:

France, \$500 million, primarily to meet the cost of importing equipment and material for rehabilitation and modernization of its industry; these materials include transportation and public utilities equipment, fuel, and both agricultural and industrial raw materials.

Czechoslovakia, \$350 million, capital equipment and raw materials for both reconstruction and development of its industry, agriculture, construction and transportation.

Iran, \$250 million over a 5 to 7-year period, for development and modernization of its industry, agriculture and transportation facilities.

Denmark, \$50 million for importing capital goods and raw materials to rebuild and expand its industry and agriculture.

Chile, \$40 million for development of power facilities, electrification of railways, and modernization of port and transportation facilities.

Luxembourg, \$20 million for general rehabilitation and restoration of national economy.

Poland, \$600 million to finance imports for a 4-year plan for reconstruction and development.

The Netherlands has submitted

The CONE AUTOMATIC MACHINE COMPANY

sees many
GOOD THINGS AHEAD

It is reported that

Ralph C. Coxhead Corp. of New York has a new Vari-Typer that uses 600 styles and sizes of type, plus foreign language, chemical, mathematical and other symbols.

get ready with CONE for tomorrow

Patent 2,409,181 covers a sectional motor truck that can be separated into three pieces and carried anywhere by air.

be ready with CONE for today

Stromberg-Carlson has a new inexpensive adaptor that will enable most owners of pre-war FM sets to receive broadcasts on the new band.

get ready with CONE for tomorrow

Frigidaire, Division of General Motors, is making a plastic lid for its ice cream cabinets that is claimed to be 50% lighter than steel.

be ready with CONE for today

New England Carbide Tool Co. is taking tungsten carbide to the housewife in its new precision knife sharpener.

get ready with CONE for tomorrow

The State of Minnesota will go into business with Continental Machines, Inc. to engage in a continuous chemical process for the extraction of pure iron from slate formerly wasted at the Mesabi iron range.

be ready with CONE for today

The New Holland Machine Co. of New Holland, Pa., will test its new flame cultivator on truck and garden crops in the Rio Grande Valley this winter.

get ready with CONE for tomorrow

Bell System's first experimental rural radio-telephone circuit connects 8 Colorado farms with the Cheyenne Wells central office. Wind driven generators supply power.

The four largest alternating current motors ever built, 65,000 horsepower each, will be made by Westinghouse for Grand Coulee.

be ready with CONE for today

Lockheed's Little Dipper light plane is reported to cruise at 100 m.p.h. and land at 20.

get ready with CONE for tomorrow

A mobile alcohol plant built into a five car train that could travel from farm to farm was demonstrated at the National Chemical Exposition.

be ready with CONE for today

Phthalic anhydride, one of the most important ingredients in the manufacture of paints, is now being made from petroleum by Oronite Chemical Company.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION



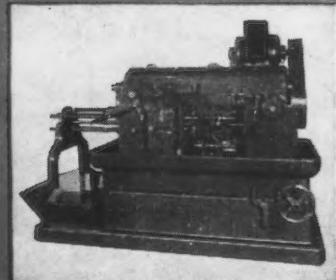
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The $\frac{7}{8}$ " 4-Spindle Conomatic, ordinarily assigned to rugged jobs, produced the brass pieces shown in 6 seconds each, including tapping.

Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.



38

Climax Molybdenum Corp. is working on two new high temperature alloys. One has 60% chromium, 25% molybdenum and 15% iron. The other has 60% chromium, 15% molybdenum and 25% iron.

get ready with CONE for tomorrow

The Gyro-Glider developed at the General Electric Flight Test Center has a rotor instead of wings and weighs 120 pounds, ready to fly.

be ready with CONE for today

M. W. Kellogg Co. has a new process for separating a considerable number of useful substances from fish and vegetable oils using liquefied propane at high pressure.

get ready with CONE for tomorrow

The Texas Company's new cold weather aircraft fuel is claimed to start an engine and to permit switching to regular aircraft gasoline in two minutes, in spite of extremely low temperatures.



The New Udylite Junior Fully Automatic Plating Machine is a significant achievement in the field of plating equipment. Some of the highlights are:

- 1 Performs the complete plating cycle
- 2 Requires no electrical controls
- 3 It is chainless
- 4 Operated by just two pneumatic units
- 5 Significant saving in floor space
- 6 Designed and built on mass production basis
- 7 Production 100 racks per hour
- 8 Sold under the full Udylite Guarantee

Write for descriptive bulletin

THE **Udylite** CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES



a request but not a formal application for \$500 million for financing imports and expansion of industrial facilities.

The total dollar capital of the Bank at present is approximately \$562,600,000.

Canadian Nickel Output In 1946 Shows Big Drop

Ottawa

• • • Production of nickel in Canada during 1946 was the lowest yearly rate since 1937, according to a return table in the House of Commons. Canada's leadership in world nickel production is apparent from a comparison of the output with that of other countries for the year 1944. The return disclosed 137,299 tons in all forms produced from Canadian ores. There were 990 tons produced in the United States, chiefly as a by-product in the electrolytic refining of copper; 7411 tons were produced in New Caledonia, the estimated content of matte and ore exported; 5100 tons were produced in Cuba, being nickel content of oxide; Norway produced 583 tons.

For 1945 Canada produced 121,978 tons; the United States, 1155 tons; Cuba, 12,000 tons of nickel in oxide; while New Caledonia output in 1945 was about the same as in 1944.

The return explains that there was no large production in the Petsamo district of Finland, where work was mainly for rehabilitation, but late in 1945 operation of the Kaulatunturi mine, having the largest of the sulphide orebodies, was reported as having been resumed. Productive mines in the USSR were at Chenger-Sai and Kimpersaisk, in the northern part of the Oblask district in eastern Hazakhstan. It was estimated that during 1945 nickel production in the USSR might have risen to a rate of 10,000 tons per annum, but there is no official verification.

Following are comparative nickel production and values in Canada for years 1938 to 1946 inclusive:

Year	Tons	Value
1938	105,286	53,914,494
1939	118,053	50,920,305
1940	122,778	59,922,591
1941	141,129	68,655,795
1942	142,605	69,998,427
1943	144,009	71,675,322
1944	137,299	69,204,152
1945	124,565	61,982,133
1946	95,405	46,844,738

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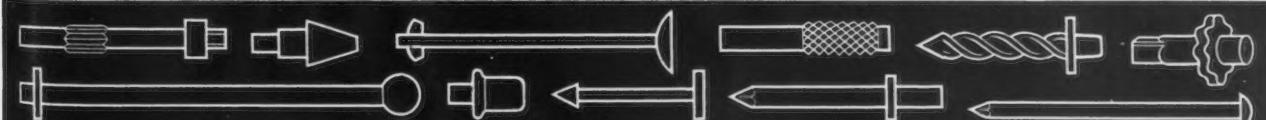
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HASSALL cold-heading may solve your immediate special part problem . . . Special nails, rivets and threaded parts made in diameters from $1/32"$ to $3/8"$ —lengths up to 6" . . . Rivets $3/32"$ diameter and smaller a specialty . . . Variety of metals, finishes and secondary operations . . . Economy, quality and quick delivery in large or small quantities . . . Tell us what you need . . . We will answer promptly. **ASK FOR FREE CATALOG.** 3-color Decimal Equivalents Wall Chart free on request.



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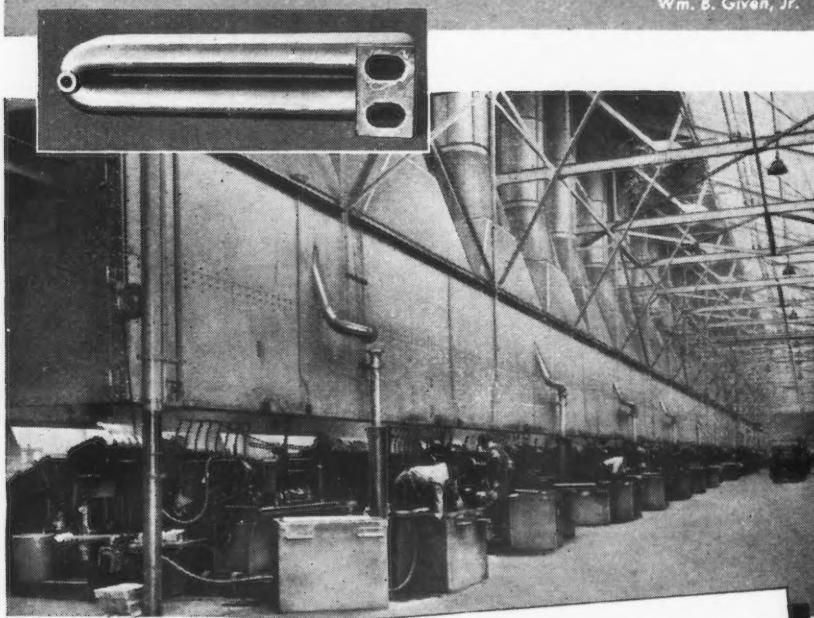


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Wm. B. Given, Jr.

NEWS OF INDUSTRY



Harvester Lists Types Of Products Affected By Price Reductions

Chicago

• • • International Harvester Co., in carrying out its announced program of reducing prices of its products by approximately \$20 million a year, has now published specific price reductions on 163 basic models of tractors, farm machines, industrial power equipment and motor trucks. The price reductions, which were made effective as of Mar. 10 to domestic consumers, ranged from \$2.50 to \$300 and from 1 pct to 23.8 pct. Officials of the company point out that it was not possible to reduce prices on all its products but reductions were made wherever possible. They estimated the reductions would benefit more than half the company's customers.

A summary of the individual types of products affected by price reductions and the range of reductions were given as follows:

Farm Tractors — Affects 12 basic models. Price reductions range up to 10.6 pct and from \$10 to \$134.

Plows — Affects 52 models of plows. Price reductions range from 3 pct to 10.7 pct and from \$9 to \$20.

Cultivators — Affects 13 basic models. Price reductions range from 4.5 pct to 7.4 pct and from \$5 to \$10.

Listers and Middlebusters — Affects 7 models. Price reduction was \$5 in each case. Percentage of reduction ranges from 2.8 pct to 4 pct.

Corn Planters — Affects four basic models. Price reduction was \$5 in each case. Percentage of production ranges from 3 pct to 4.8 pct.

Grain Drills — Affects 11 models. Price reductions range from 4.4 pct to 6.3 pct and from \$14.25 to \$20.

Mowers — Affects 2 basic models. Price reductions were 2.5 pct and 5 pct and from \$4 to \$11.50.

Sweep Rake — Affects one model. Price was reduced \$5 or 5.5 pct.

Pickup hay baler — Affects one model. Price was reduced \$75 or 4.1 pct.

Self-Propelled Combine — Affects one basic model. Price reduction was \$122.50 or 3.4 pct.

Ensilage Cutter — Affects three models. Price reduction in each case was \$22.75, a percentage range of 4.8 pct to 7.1 pct.

Two-Row Mounted Corn Picker — Affects one model. Price reduction was \$52 or 6.4 pct.

Ensilage Harvester — Affects one model. Price reduction was \$33.75 or 3.9 pct.

Hammer Mill — Affects two models. Price reductions were \$5 in each case, percentage changes were 1.9 pct and 3 pct.

Lime Spreader — Affects one basic model. Price reduction was \$2.50 or 3.9 pct.

Power Loader — Affects one model. Price reduction was \$25.50 or 8.9 pct.

Manure Spreader — Affects one model. Price reduction was \$13 or 3.5 pct.

Milker Units — Affects two models. Price reductions ranged from 14.4 pct to 18.4 pct and from \$12 to \$17.

Milker Vacuum Pumps — Affects two models. Price reduction was \$17 in each case, percentages were 11.5 pct and 19.6 pct.

Portable Milker Vacuum Pumps — Affects two models. Reduction was \$17 in

MEEHANITE CASTINGS as made by BRAKE SHOE

a "below-the-surface" selection in tin plate immersion melting

WHEN Kemp immersion melting equipment was decided upon for one of the world's longest lines of tin-stacks, the choice of heating element was carefully made. The tin plating of steel demanded the travel of flue gas through a complete tubular loop below the surface of the metal bath. Determining the best metal for this loop called for full consideration of strength and pressure tightness as well as resistance to thermal shock due to intermittent heating.

The answer: structurally sound non-porous castings of heat-resisting Meehanite, free from all foundry defects and suitable for immersion in dense liquids. The practical benefits: a method was made possible that surpassed external-firing practice by consuming less gas, controlling temperatures more closely, reducing dross formation drastically and increasing production rate.

As in this case of The C. M. Kemp Mfg. Co. of Baltimore, Md., you can get a type of Meehanite which closely fits a specific set of job requirements in its metallurgical content and combination of performance characteristics. Meehanite castings as made by Brake Shoe give you the further assurance of an unequalled foundry background.

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FOR *Your* JOB

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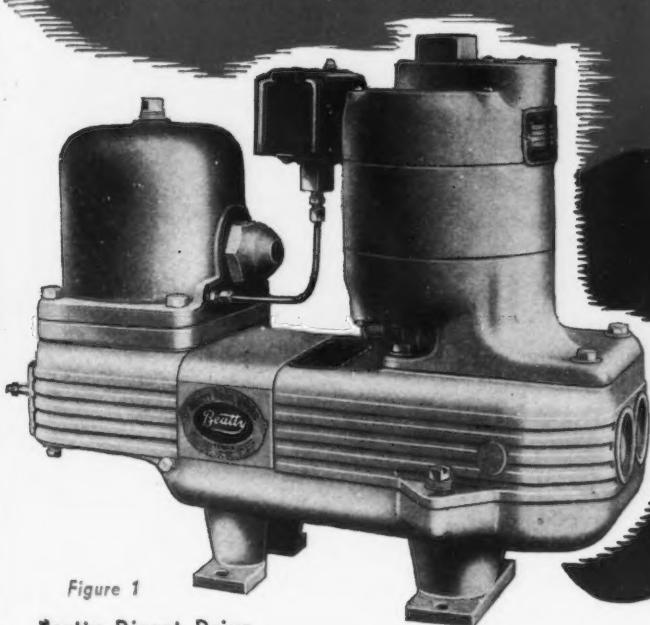


Figure 1

Beatty Direct Drive
Duplex Pressure Pump.

● Pump units of the type illustrated (Figure 1) manufactured by Beatty Bros. Limited, Fergus, Ontario, require a combination of high-quality engineering characteristics in the castings from which they are constructed. Shown in Figures 2 and 3 are two Meehanite components of the pump unit, while Figures 4 and 5 illustrate Meehanite Castings used in two other types of pumps manufactured by this company.

Note the variety of requirements including wear, dense, uniform grain structure, strength, corrosion resistance and pressure tightness.

These properties are achieved in Meehanite Castings by careful and strict control of the processes of manufacture and by the application of scientifically evolved metallurgical techniques. These methods permit the achievement of the constitution and metal structure necessary in the castings so that they will meet the service demands.

Write for our Bulletin No. 7 "Meehanite - the Metal for Pump Castings."

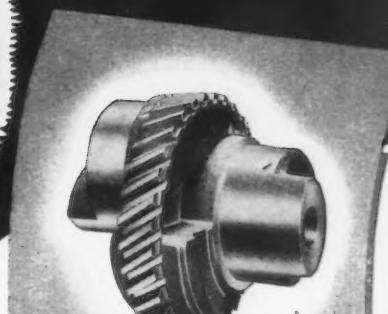


Figure 2

Meehanite worm gear with eccentrics for Beatty pressure pump. Wear resistance in the gear teeth and uniform grain structure required.



Figure 3

Crosshead for the same pump cast in Meehanite providing uniform texture, machinability and wear resistance.

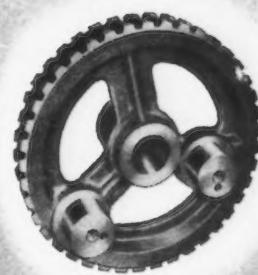


Figure 4

Worm gear for a deep well working head. Meehanite provides high strength and wear resistance to the gear teeth and integral crank pins.



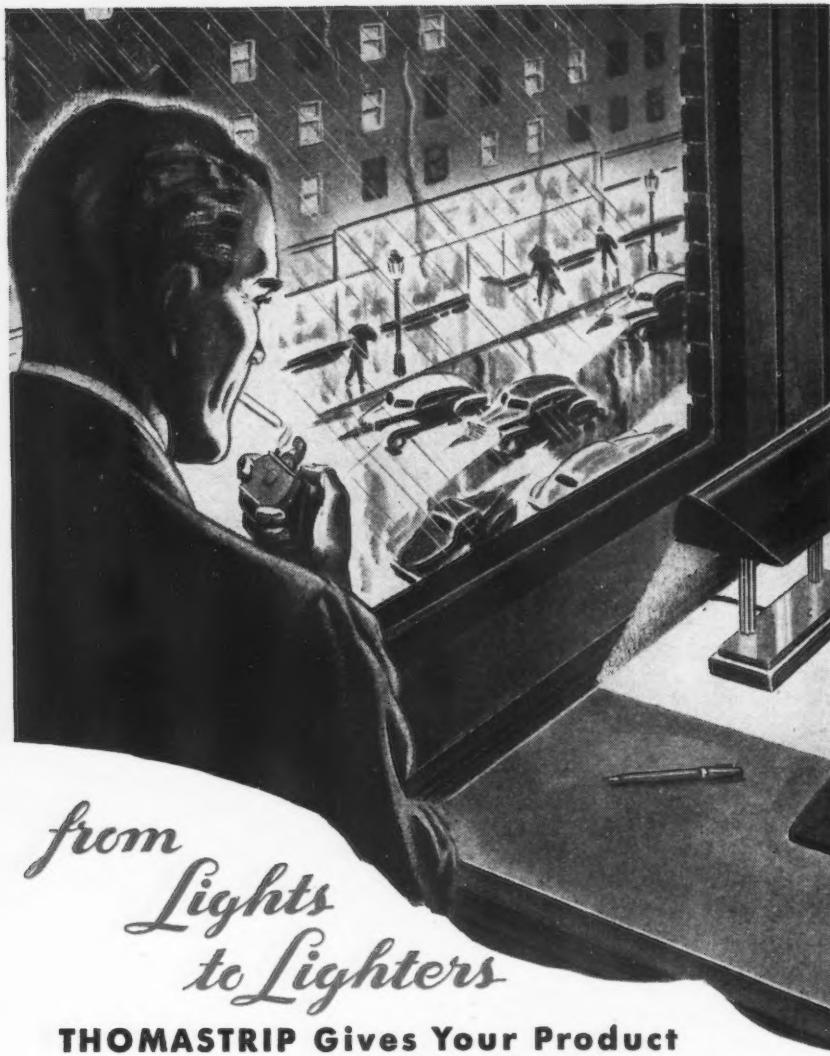
Figure 5

Chemical pump cylinder block. Pressure tightness and resistance to corrosion are required.

MEEHANITE

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NEW ROCHELLE, N. Y.

Means
BETTER CASTINGS



from
lights
to lighters

**THOMASTRIP Gives Your Product
That Extra Sales "Spark"**

• Flick your cigarette lighter... snap on the lights in your home, office or car... chances are, you're putting THOMASTRIP to work. For THOMASTRIP is used throughout all industry—in a wide variety of products—because of its cost-cutting features, its adaptability, and many design applications. In the lighting field, production men and designers have specified THOMASTRIP—coated and uncoated—for cables, switches, wall plugs, reflectors, lamps, and fixtures.

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Cold Rolled Strip Steel Specialists

WARREN • OHIO

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STRIP COLD ROLLED STEEL

NEWS OF INDUSTRY

each case, percentages were 11.3 pct and 11.7 pct.

Stainless Steel Milker Pails—Affects two models. Price reductions were \$5 and \$10 or 18.5 pct and 23.8 pct.

Cream Separators—Affects four models. Price reduction was \$13.25 in each case. Percentages ranged from 8 pct to 10.4 pct.

Tractor Trailer—Affects one basic model. Price reduction was \$12.75 or 5.5 pct.

Milk Coolers—Affects five models. Price reductions ranged from \$8.00 to \$18.00 and from 1.9 pct to 4.3 pct.

Industrial Tractors (crawlers)—Affects four basic models. Price reductions ranged from \$35.00 to \$50.00 or from 1 pct to 1.6 pct.

Industrial Power Units—Affects eight models. Price reductions ranged from \$10.00 to \$150.00 or from 2.3 pct to 11.4 pct.

Industrial Tractors (wheel)—Affects four basic models. Price reductions ranged from \$19.00 to \$56.00 and from 1 pct to 3.4 pct.

Motor Trucks—Affects 12 basic models. Price reductions ranged from \$50.00 to \$300.00 and from 1.9 pct to 3.6 pct.

Motor Truck Attachments—Affects seven items. Price reductions ranged from \$6.25 to \$268.00, including a change in specifications on two items.

**Canadian Firm Begins
Output of Magnesium**

Montreal

• • • Aluminum Co. of Canada, Ltd., has started operations at its new magnesium plant at Arvida, Que. Magnesium and magnesium alloy ingots will be produced to supply the company's light metal fabricating plants and for general market distribution, officials state. Present domestic needs will not absorb total schedules' output, thus it is likely that the bulk of magnesium produced will go to swell Canada's export trade.

The Aluminum Co. of Canada's magnesium plant has a rated capacity of 1000 tons a year and is so designed that it can be enlarged as demand increases. The process used by the new plant is the electrolysis of magnesium chloride, which is made from magnesium oxide. During the war the company started fabrication of magnesium alloys, mainly for Canada's aircraft industry. Such products as magnesium alloy die, permanent mould and sand castings, rod, bar, sheet and forgings can be made at Etobicoke and Kingston, Ont., plants controlled by the company. Since many aluminum alloys contain magnesium, and most magnesium alloys contain aluminum, the two metals are dependent to a certain extent on each other; both are indispensable to the light metal industry.

Magnesium oxide is produced at the company's plant at Wakefield, Que., using brucite from the Gatineau valley deposits.



USE THIS THREADED STEEL HOLE FOR TIGHT FASTENING IN SOFT MATERIAL

You can ensure fastenings that will stay tight in soft metals, plastics or bonded metals, even under vibration and torque.

The Rosan Fastening System provides a threaded steel hole (or stud) which holds firmly in the parent material. The design is based on a serrated ring which locks an insert or stud in position and so prevents loosening or turning. It can be removed by drilling—and replaced—without disturbing the parent material.

Send for this useful catalog of Rosan Threaded Inserts and Studs by *National*.

Other "National" Specialties Include:



Clutch Head Screws

Davis Blind Fasteners

Drake Lock Nuts

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Hi-Shear Rivet Pins and Collars

Huglock Nuts

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"Lok-Thred" Studs

Marsden Lock Nuts

Phillips Recessed Screws

Place Bolts

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NATIONAL
THREADED INSERTS & STUDS

Manufactured By
THE NATIONAL SCREW & MANUFACTURING CO.
CLEVELAND, OHIO

Manufactured By
THE NATIONAL SCREW & MANUFACTURING CO.
CLEVELAND, OHIO

PRINCIPLE

The principle of the Rosan locking system is extremely simple and basic. A lock ring accurately serrated both inside and out, engages its inner edge with a notched serrated collar on the insert or stud. The outer surface of the locking ring bears their way into the parent material at the surface of a countersink when driven or pressed into place. This makes the insert or stud an integral part of the parent material and creates a completely permanent seal.

REMOVAL

Both blind inserts and studs can be readily removed for replacement without injury to the parent material. This is accomplished by drilling to the depth of the lock ring with a drill or counterbore. A counterbore tool and separate part handle is utilized to destroy the lock ring from the hole. The insert can be easily removed with any extraction tool, i.e. square drive, Allen head wrench. In case of the stud, the locking connection can be broken by the above method or by using the hollow mill to a depth equal to the thickness of the ring, to destroy the serrations between the locking ring and the stud.

DRIVE TOOL PRESSES
DRILL FLUSH WITH
INSERT

INTERNAL COUNTERBORE
ALLOWS INSTANT MATE
WITH SERRATIONS
WITH INSERT

INSTALLATION DOES NOT DAMAGE
PLATING OR THREADS

BROACHED SERRATIONS
PREVENTS INSERT FROM
TUMBLING OR LOOSENING

TOTH FORM
INJURIES MATERIAL
UNDER TORQUE,
TEMPERATURE,
PRESSURE VARIATIONS

TYPES

THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

**U. S. Firms to Take
Equal Part in Highway
Program in Philippines**

Washington

• • • Announcement that bids by American firms on public works programs scheduled under the Rehabilitation Act will be accepted on an equal footing with those by Filipino contractors has opened the way for American firms to take part in highway and similar programs planned by the Philippine Government under the Act.

As a beginning, a total of \$10 million has been allocated for highways during the fiscal year 1947 under the Philippine rehabilitation program. So far, 18 construction projects have been approved at a total estimated cost of \$4.3 million including eight paving projects and the construction of 10 bridges ranging in span from 23 to 336 ft.

Under a recent opinion rendered by the Philippine Secretary of Justice, Filipino contractors are entitled to and will receive preferential treatment in the awarding of all public works contracts financed entirely by the Island Government.

However, under the ruling, American firms considered qualified by the U. S. Government must receive equal consideration in the bidding and award of contracts financed either wholly or in part by the United States.

In addition, the ruling has the effect of lifting a number of restrictions imposed on American contractors. It permits American firms receiving such contracts to take equipment and supplies to the Islands subject only to the same taxes ordinarily imposed upon Philippine contractors. Under legislation and by agreement between the two governments, no import taxes will be levied on such equipment and supplies intended for use on road construction under the Act.

Also, contractors may take key personnel to the Islands without regard to immigration quotas. Perhaps more important, American contractors are released from a restriction which normally would require them to employ a registered Filipino engineer to take complete charge of the work.

LET THIS
Floor Pattern

Guard Danger Zones in your Plant!

WHEREVER there is work to be done, men need protection from stumbles, falls and fatigue that frequently cause serious injuries. In plants where industrial trucks must move safely and speedily, flooring must be extra strong and durable. That is why so many plant managers have installed U-S-S Multigrip Floor Plate on entire floors, on aisles, walkways, ramps, step plates and other spots that have proved to be accident breeders.

In the illustration you can readily see that Multigrip is designed for safety. The arrangement of its closely-spaced risers assures positive traction and skid resistance, in every direction. These flat-topped risers are comfortable under foot, tending to reduce fatigue and increase efficiency.

Rolled of tough, durable steel, Multigrip Floor Plate protects the underfloor, strengthens it structurally, and remains safe—wet or dry—under the wear and tear of plant traffic for years on end. Easily cleaned, quickly installed, Multigrip reduces lost man-hours and vehicle repair. It increases the life of flooring, thereby decreases its cost. Write today for information or contact your local U-S-S Multigrip distributor.

POWER HOUSE FLOORS



**U-S-S MULTIGRIP
FLOOR PLATE**

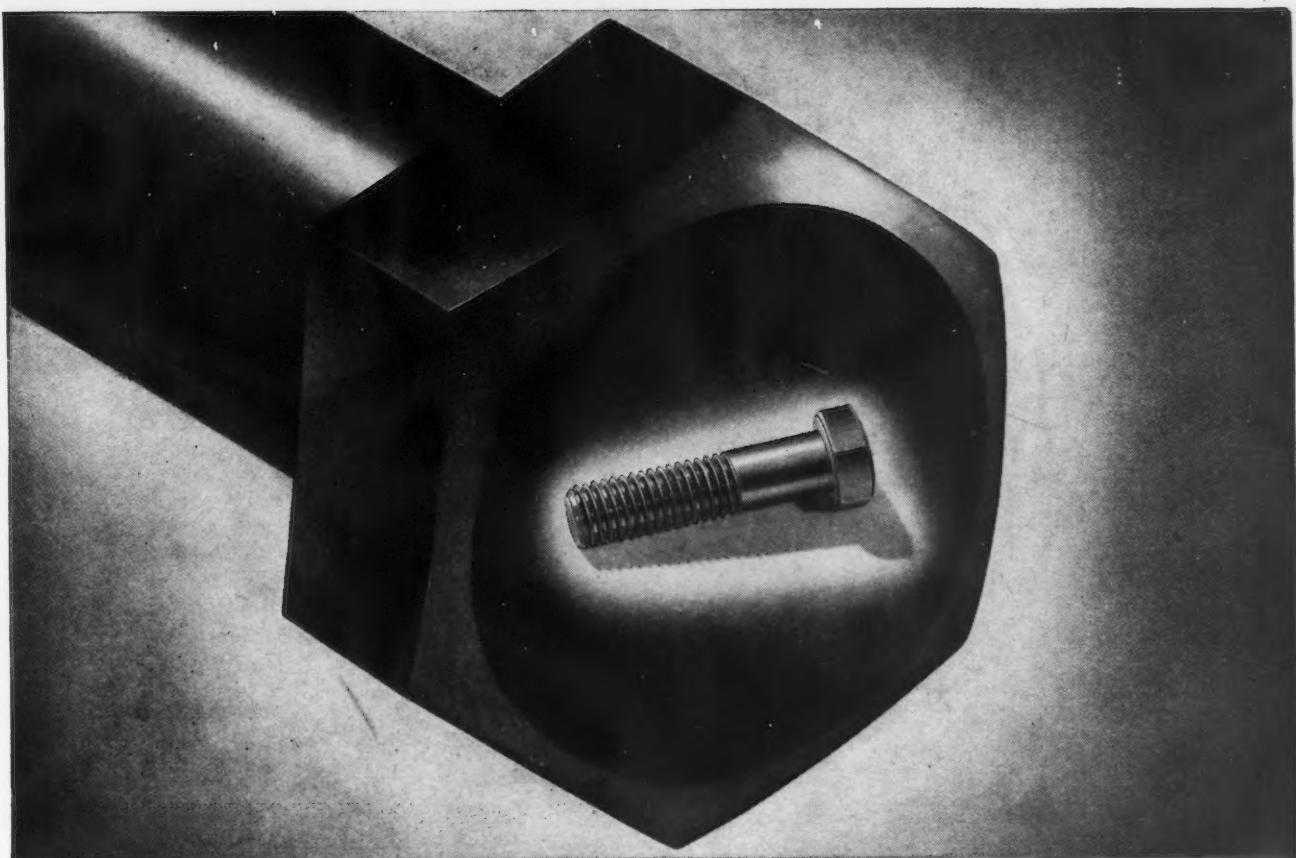
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UNITED STATES STEEL



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Raw material that is subjected to the most rigid mechanical and physical examination . . . cold-forming on the most modern machinery . . . continuous inspection at every stage of manufacture . . . contribute to your assurance that R B & W Cap Screws will have uniformly high physical properties and a finish that enhances the appearance of the finished product.

Such facilities as spheroidizing furnaces, close control heat treating, finest heading and threading equipment enable R B & W to manufacture its products to meet the severe stress conditions and close tolerances required of highest quality Cap Screws.

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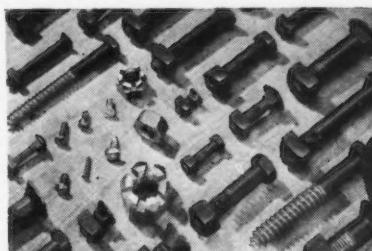
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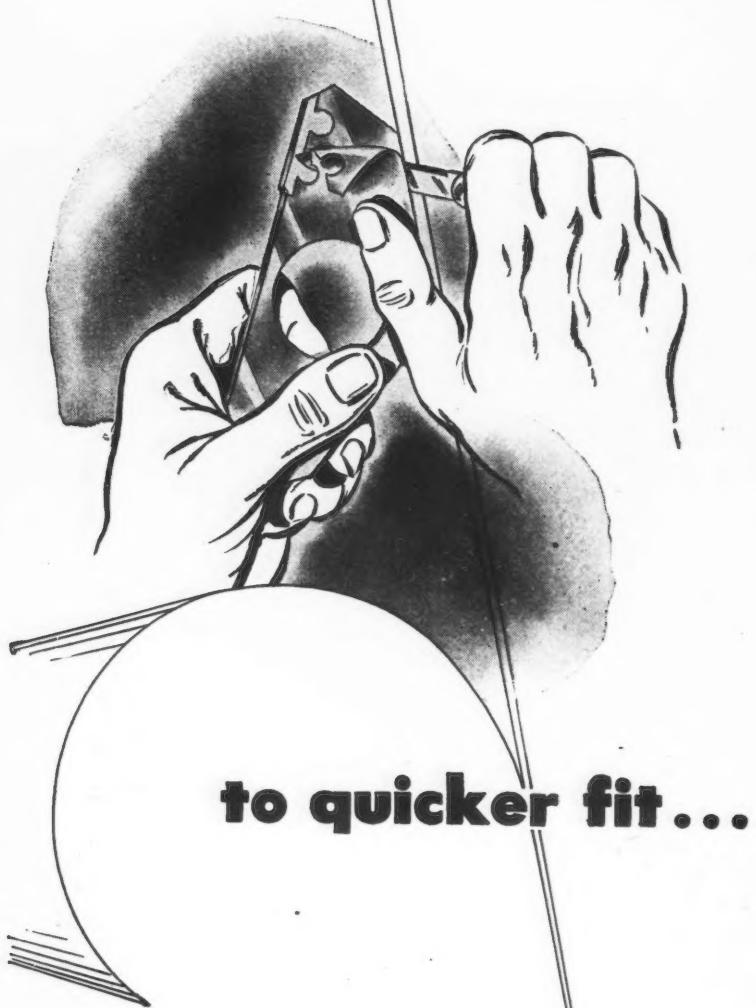
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THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

NEWS OF INDUSTRY

Franklin Institute Will Present 3 Medals For Special Contributions

Philadelphia

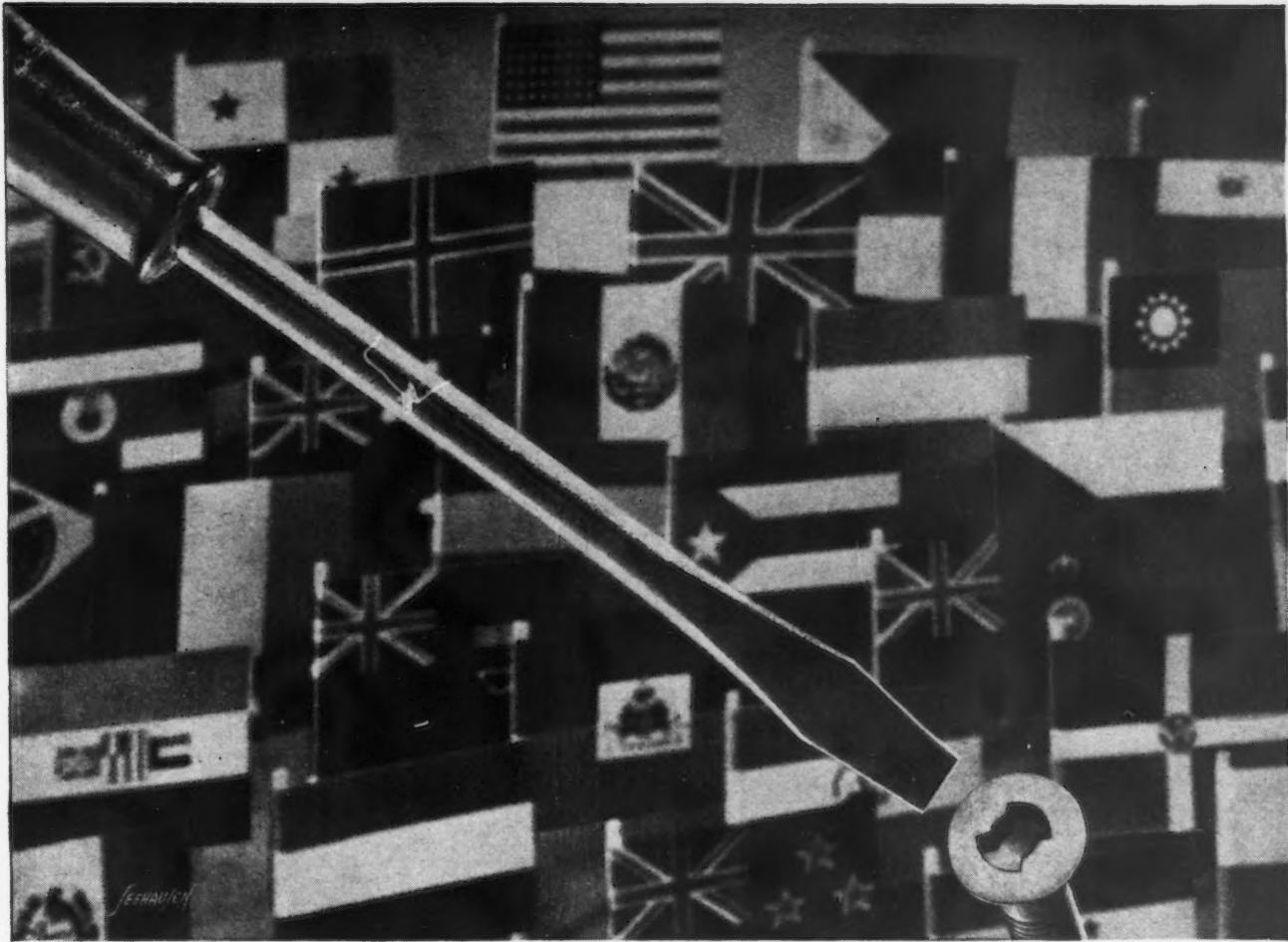
• • • Winners of the Frank P. Brown medal, the Francis J. Clamer medal, and the two George R. Henderson medals of The Franklin Institute were announced recently by Dr. Henry B. Allen, executive vice-president and secretary. The medals will be awarded at the annual medal day ceremonies at the institute on Apr. 16.

Karl P. Billner, president of the Vacuum Concrete Corp., Philadelphia, will be awarded the Brown medal "in consideration of his invention of a practical process for treating concrete, together with the development of suitable equipment whereby the qualities of the concrete are improved and the elapsed time of construction is reduced."

Edgar H. Dix, Jr., director of metallurgical research for the Aluminum Co. of America, will receive the Clamer medal "in consideration of his meritorious contribution to the development of high strength corrosion-resistant aluminum products."

Dr. Lars O. Grondahl, director of research and engineering at the Union Switch & Signal Co., Pittsburgh; and Sedgwick N. Wight, engineer of train operation at the General Railway Signal Co., Rochester, N. Y., will each receive a Henderson medal. Mr. Grondahl will receive the medal "in consideration of his contributions over a period of years to the development which has resulted in making available a practical system of inductive train communication." Mr. Wight will receive it "in consideration of his accomplishments in the invention and development of major railroad signaling systems thus contributing to the safety, speed and reliability of railroad operation."

These three medals are awarded for contributions in special fields: the Clamer medal is awarded for "meritorious achievement in the field of metallurgy," the Brown medal "for discoveries and inventions involving meritorious improvements in the building and allied industries," and the Henderson medal "for meritorious inventions or discoveries in the field of railway engineering."



TYPE "A"
ASSEMBLY BIT



At Home and Abroad

WITH CLUTCH HEAD SCREWS

A Common Screwdriver Simplifies Field Service

In the remoteness of the American prairies or in the far distant lands . . . in any language . . . the screwdriver is a universal tool, always available.

Accordingly, the logical design of CLUTCH HEAD screws for operation with any flat blade is important to the manufacturer whose reputation is staked upon the peak performance of his product in the field . . . upon the ease and readiness with which immediate adjustments can be made.

Note that the basic design of the clutch requires that the flat blade be *reasonably accurate in width only* . . . that the roominess of the clutch permits great latitude in thickness of the blade.

CLUTCH HEAD is the one and ONLY modern screw specifically engineered to give you the dual advantage of safer, higher speed assembly operation with the Type "A" Bit . . . plus simplified field service with common screwdriver control.

ally by sending for assortment of screws, sample Type "A" Assembly Bit, and illustrated Brochure . . . to come by mail.



COMMON
SCREWDRIVER



CLUTCH HEAD has unmatched features that contribute to safer, faster, lower-cost production. You may check these person-



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When you have a BURRO in the yard, you get jobs done faster, easier and more economically. This speedy, powerful locomotive crane does every job a crane can do with bucket, hook, magnet, tongs or drag-line and at the same time, serves as your private switch engine to spot cars where and

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1303 S. Kilbourn Ave., Chicago 23, U.S.A.

**WAA Announces Sale
Of Five Surplus War
Plants for \$990,000**

Washington

• • • Sale of five surplus war plants and real property for a total of \$990,000 has been announced by WAA, including a former top secret plant which produced and tested jet propellant units. Combined cost of construction for the several plants was \$3.5 million.

Located near Azusa, the jet plant has been sold to its wartime operator, the Aerojet Realty Corp., for \$420,000.

Wartime property at Fitchburg, Mass., has been bought by the former operator, Fitchburg Engineering Corp., and will be used to increase production of special purpose machine tools.

Property operated by the Air-cooled Motors Corp., at Salina, N. Y., has been sold to that firm for \$140,000 and will continue to be used for the assembly and testing of airplane motors.

A surplus building, purchased originally by the M. B. Mfg. Co., has been resold for \$125,000 to Miller Motors Co., of Providence, which will utilize it for the manufacture of automotive parts.

Land, buildings and machinery at Wellsville, Ohio, have been sold to the wartime operator, McLain Fire Brick Co., for \$90,000 cash.

Plan Heating Research

Cleveland

• • • More than 100 representatives of trade associations, manufacturers and technical societies met here last week with leaders of important segments of the heating, ventilating and air conditioning industry, unanimously voted that the American Society of Heating and Ventilating Engineers should undertake the correlation and coordination of radiant panel heating research.

At the meeting, held in the Society's research laboratory, it was recommended that a committee of representative groups, a technical advisory committee on panel heating, be selected to study the need for research into instrumentation, physiological effects and heat transfer through and from materials.

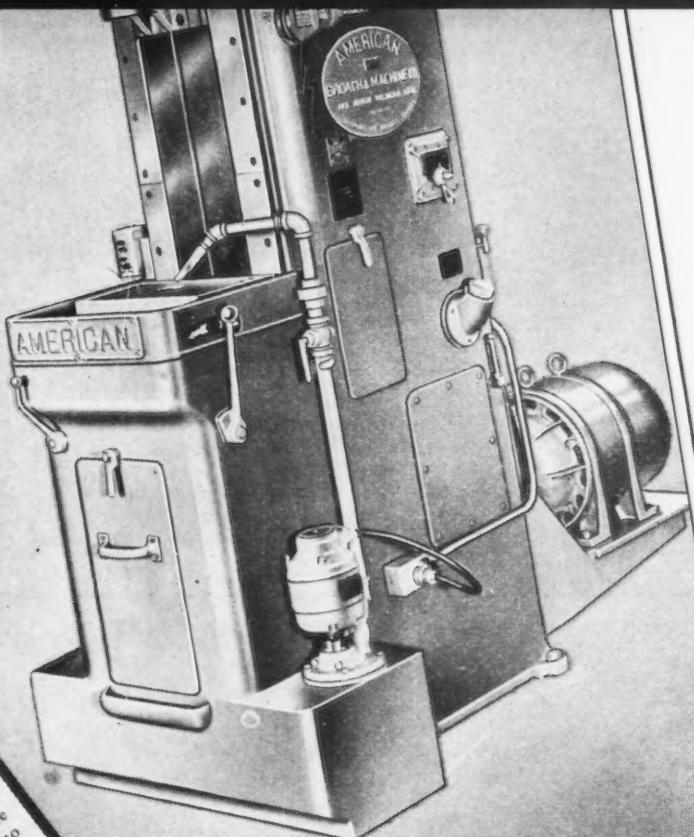
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Canadian Independence Of Imports of Steel Hindered by Shortages

Hamilton

• • • H. G. Hilton, president of the Steel Co. of Canada Ltd., announced that the strike and labor shortages has set back Canada's independence of imported steel by at least 1 year. Mr. Hilton's statement followed the announcement by C. D. Howe, Canadian Minister of Reconstruction, that expansion programs of the Steel Co. of Canada and the Dominion Foundries & Steel Co., has made Canada almost self-sufficient and no longer dependent on imports for steel plate and cold-rolled sheeting.

Mr. Hilton pointed out that delay in completion of a multi-million dollar expansion program at the Steel Co. of Canada, caused by shortages of labor and strikes affecting material supply to contractors, had set back Canada's independence in the matter of steel plate and cold-rolled sheeting production until early next year. Since 1939, Steel Co. of Canada's production has increased 2½ times. With keen demand for steel continuing, the Federal Government ban on export, introduced during the war, continues.

Although two major projects at the Hamilton works of the Steel Co. of Canada were expected to be completed at an early date, problems in construction and related industries have deferred completion until early in 1948, at which time Mr. Howe's prediction of self-sufficiency will become a fact.

Although prospects are that the ban on exports of steel will continue for some time, and the keen demand for several years, steel executives decline to conjecture as to possible further plant expansions in 1948.

In his recent statement, C. D. Howe made reference to the manner in which the steel industry at Hamilton had become diversified through wartime demands. He stated that "the largest increases in products were in openhearth steel, pig iron, electric steel, blooms, billets, plate, strip and sheets. Sizes and shapes formerly imported were now produced here in increasing number.

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NEWS OF INDUSTRY

Monsanto to Spend \$50 Million in Construction

St. Louis

• • • Board Chairman Edgar M. Queeny, Monsanto Chemical Co., at the annual stockholders' meeting, said that construction involving \$50 million for new facilities centered on the production of new postwar products is in the engineering and planning stages, and more than \$22 million is already under construction by the company. Mr. Queeny said that the largest portion of the postwar program consists of facilities for products that are either wholly new or relatively new to the company. "Only a small amount," he explained, "represents additional plants for our old line products except as they form raw materials for newer ones."

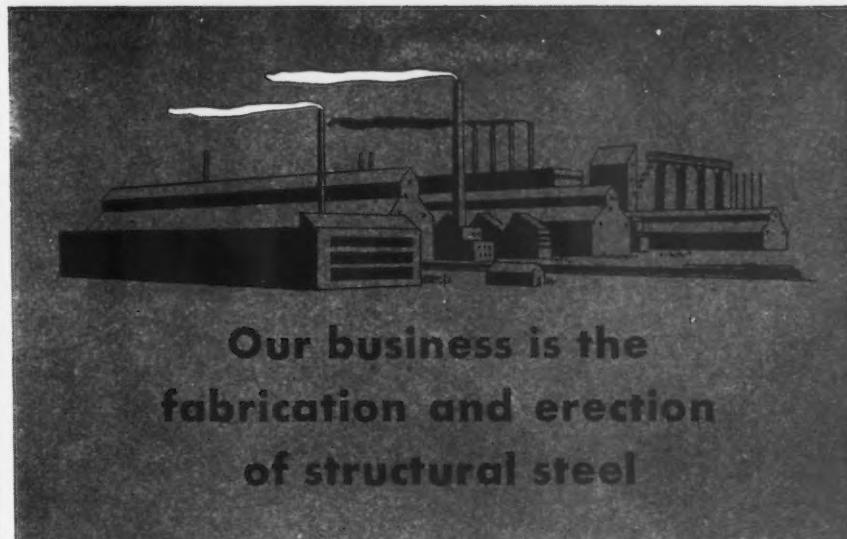
William M. Rand, president, announced during the meeting that Monsanto's sales almost reached the \$100 million mark for 1946. Profits after taxes were twice as large in 1945 and in the past 10 years the company's net sales have increased 250 pct. Mr. Rand stated that the overall employment increased 21 pct for the past year, with an increase of 40 pct in the Monsanto sales department. These increases occurred despite the loss of 1,926-380 man-hr of production at three key plants due to strikes, the company's president disclosed. More than 15,300 persons were employed by Monsanto on Jan. 1 of this year.

Requests Market Guarantee

Washington

• • • Housing Expediter Frank R. Creedon has requested the RFC to negotiate a guaranteed market contract with Pemberton Lumber & Millwork Corp. (Johnson Quality Homes), of Brooklyn, N. Y., for the production in 1947 of 6000 prefabricated wooden homes.

When negotiated, this will be the twelfth market guarantee entered into and will bring up to 90,200 the number of prefabricated homes to be produced this year under the contracts. The company estimates that the total cost of the home, erected but not including land, will be approximately \$6000.



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Baldwin Backlog Is Big

Eddystone, Pa.

• • • In the annual report of The Baldwin Locomotive Works for the year 1946 Charles E. Brinley, board chairman, points out that the year started badly due to the strike which was called on January 21st by the USWA, causing a shutdown of approximately 12 weeks. However, beginning about April 15th, in spite of many interruptions, operations were carried on at a fair level and because of lower taxes on income net profit for the year was slightly greater than in 1945.

Mr. Brinley reports that total unfilled orders on the company's books on Jan. 1st, 1946, were \$82,866,677, and on December 31st, \$95,977,375, and adds that "as of the first of the year 1947 there remained unfilled orders sufficient to provide from 5 to 6 months' additional work on steam locomotives and negotiations are either now in progress or pending on foreign inquiries which are expected to result in further orders."

It was noted that progress was made during the year in the development of diesel-electric locomotives for both passenger and freight service and that in conformity with the growing demand by the railroads for diesel-electric locomotives for all classes of service, Baldwin now builds dieselelectrics ranging from 25-ton industrial locomotives and 660-hp. switchers to 6000-hp. locomotives for passenger and freight service.

Recognize Navy Plant

York, Pa.

• • • The U. S. Naval Ordnance Plant here has been awarded honorary affiliation with the Manufacturers' Assn. of York.

The plant was originally a special ordnance plant built under Navy contract by the York Safe & Lock Co. in 1941. Subsequently, plant operation was taken over by the Special Ordnance Div. of the Blaw-Knox Co. The Blaw-Knox lease was terminated in April 1946 and at that time the plant was converted to full Navy operation under the Navy Bureau of Ordnance.

**Allis-Chalmers Strike
Is Estimated to Have
Cost About \$85 Million**

Milwaukee

• • • The Allis-Chalmers strike is ended. Rather than face the ultimate extinction of their union, local UAW 248 officials gathered the remnants of the membership and proposed ending the affair without terms "so that the continuation of the strike could be fought on the inside rather than the outside."

The company estimates the strike cost at \$85,000,000. "The strike rolled up a series of spectacular events and statistics," says Robert J. Riordan of *The Milwaukee Sentinel* who made a survey of the strike since its origin and relates how its eight massive picket line clashes, featuring mobs that numbered in the thousands, resulted in 151 arrests and injuries to scores of persons, including 61 policemen. More than 500 peace officers patroled some of the demonstrations.

Conciliators who tilted their lances at the strike—and broke them—ranged right up to the top, Secretary of Labor Lewis Schwellenbach.

The cost figure was broken down by the company into \$20,000,000 lost in pay rolls, and \$65,000,000 lost in production. These figures should be considered, however, with the fact that the company turned a profit of \$144,487 for 1946, with a \$25,400,000 tax rebate from the federal government—and a large majority of the strikers found jobs elsewhere.

Of the 151 persons arrested, six have been convicted and fined a total of \$750; two cases were dismissed and 143 are pending.

Never solved was the series of more than 90 paint throwing attacks in which windows were smashed and walls and furnishings ruined in Milwaukee and Waukesha Counties.

The strike began April 30, 1946, after more than 8000 workers at noon, April 29, had laid down their tools in the West Allis works and paraded to State Fair Park, where union officials announced a walkout was approved, 8091 to 251.

Wages were not directly in issue at that time, although the union later put in a demand for

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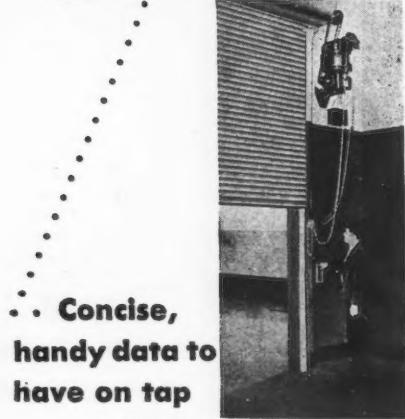
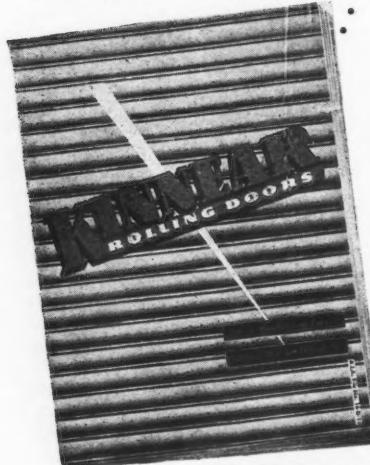
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NEWS OF INDUSTRY

25 cents per hour. The main issues were changes in grievance procedure and maintenance of membership.

Much later in the strike, the union intensified the second issue with a demand for union shop.

Broadly speaking, the strike was divided into two phases. In the first phase, the union was driving for government seizure of the struck plant, along with six other struck A-C factories which later settled on company terms.

This phase broke in midsummer when Secretary Schwellenbach gave the company a 48-hour ultimatum to settle up or be seized—and then couldn't or didn't deliver the seizure.

Thereafter, in the second phase, the company's chances of riding out the strike improved steadily as workers at first drifted, then streamed back to work through the picket lines, until more than 6000 out of 11,000 had come back.

The strike started mildly enough, but riots began Sept. 9, 1946, and continued through Dec. 9—the period when production workers began to return to work.

The last two riots featured 3000 persons on the lines Nov. 25, and 7000 on Dec. 9.

The Wisconsin Employment Relations Board ordered Local 248 to refrain from mass picketing, and after the riots, limited pickets to two per gate.

On Jan. 26, 1947, it held a bargaining election in which the UAW eked out a two vote majority over a rebel organization, the Independent Workers of Allis-Chalmers.

The issue of representation still is unsettled.

A political feud between Walter P. Reuther and R. J. Thomas, UAW international president and vice president, was also tangled in the situation, and appears to have scuttled a possible settlement last January through mediation of Rev. Ensworth Reisner, pastor of First Methodist Church.

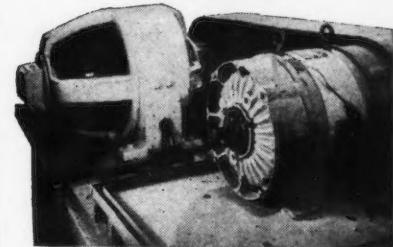
Charges of communist domination were leveled at Local 248 after its top officers and stewards signed communist nomination papers. This culminated in a perjury investigation of Robert Buse and Harold Christoffel, president and honorary president, after they swore in Congressional testimony that neither they nor the local had communist connections.

Silicone News



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Then one of our research groups developed DC 44 and DC 33. That was over two years ago. DC Silicone Greases have since been extensively tested and widely used.

DC 44 has proved to be serviceable from -40° to 350° F. and at speeds up to 20,000 r.p.m. It is also characterized by very low volatility, freedom from gumming, bleeding of less than 2% after 16 hours at 110° C. (230° F.), and weight loss of only 3.3% after 40 hours at 175° C. (347° F.).

These properties are most desirable in a grease for permanently sealed bearings. DC 44 is now used for that purpose.

DC 33 has proved to be a very useful grease over the temperature span covered in aircraft operations. It is serviceable at temperatures as low as -70° F. and still has better high temperature performance than special high temperature petroleum greases. Both of these DC Silicone Greases are described in data sheet No. S 7-4.

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Canadian Research Div. Indicates Construction Costs Will Hit \$1 Billion

Toronto

• • • In a forecast tabled in the House of Commons, the Research Div. of the Dept. of Reconstruction and Supply indicates overall expenditures in Canada on all types of construction and new business assets will be in excess of \$1 billion this year. The actual figure arrived at in the survey is \$1,739,000,000, but the survey points out that this figure will not be realized.

Scarcity of materials, though it will be considerably alleviated during the year, is still going to handicap construction programs, while labor shortages may constitute a further hindrance in the realization of investment intentions. The figure of \$1,739,000,000 shows the aggregate demand in 1947 is 53 pct above the outlay actually achieved last year, but the report states that it is unlikely available supplies will be sufficient to support this increase.

The Division has made a survey of 12,000 businesses in Canada and on the basis of this survey forecasts new investment plans as totalling \$1034 million as against \$608 million actual outlay last year. Of this total the greatest increase is in the mining industry from \$14 million to \$47 million this year. Investment in utilities is doubled and manufacturing up about 25 pct. The construction industries included in the survey made an actual outlay last year of \$56 million and plans for this year total \$95 million.

While the report describes the program for 1947 as reflecting a "healthy optimism about economic development in the future, there is also a warning note.

"The expansion indicated," it is stated, "is so substantial over a short period of time that the question arises as to the desirability of a sharp increase in investment activity that may be followed by a serious decline once market prospects lose their present buoyancy."

Repair and maintenance demands will be approximately the same as last year, which only means that any increase in available supplies will be able to go into expansion of industry and increased building activity. A forecast on production

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3. No. 1000 Cut-off machine is a heavy duty cutter for stock up to 3 $\frac{1}{2}$ ". Powered with a 3 hp. totally enclosed motor with cut-off wheel, 12" x 3/32" x 1-1/4".

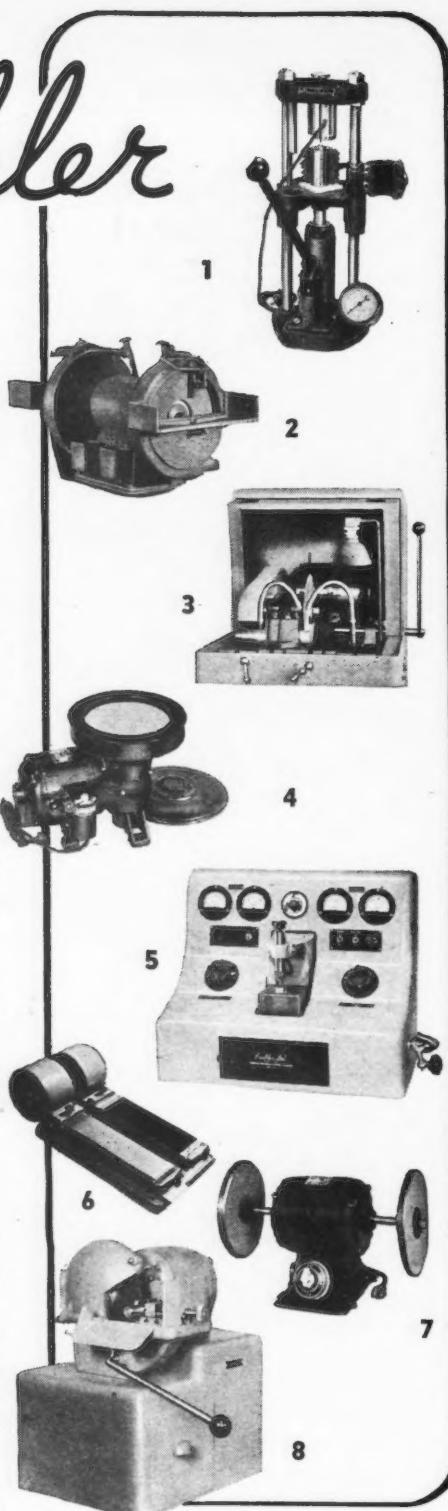
4. 1505-2AB Low Speed Polisher complete with 8" balanced bronze polishing disc. Mounted to 1/4 hp. ball bearing, two speed motor, with right angle gear reduction for 161 and 246 R.P.M. spindle speeds.

5. No. 1700 New Buehler-Waisman Electro Polisher produces scratch-free specimens in a fraction of the time usually required for polishing. Speed with dependable results is obtained with both ferrous and non-ferrous samples. Simple to operate—does not require an expert technician to produce good specimens.

6. No 1410 Hand Grinder conveniently arranged for two stage grinding with medium and fine emery paper on twin grinding surfaces. A reserve supply of 150 ft. of abrasive paper is contained in rolls and can be quickly drawn into position for use.

7. No. 1400 Emery paper disc grinder. Four grades of abrasive paper are provided for grinding on the four sides of discs, 8" in diameter. Motor 1/3 hp. with two speeds, 575 and 1150 R.P.M.

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NEWS OF INDUSTRY

of basic and building materials tabled concurrently shows increases in various items ranging roughly from 10 to 30 pct with few possibilities of decline in production. However, the one factor impossible to determine as the report points out, is trend of labor disputes, which might lead to serious interruption.

Among the outstanding increases predicted for the year in production are: Pig iron, 35 pct; steel ingots, 34.8 pct; and steel castings, 23.5 pct. The percentage change in gypsum production is estimated at 44.4 pct. Percentage increases in plumbing and heating equipment run from 16 to 40 pct.

In the breakdown of its survey by cities, the report shows planned capital expenditures, repair and maintenance in Toronto's manufacturing industry totaled \$92,924,000 of which \$69,833,000 is new capital expenditures. The total compares with an actual outlay last year of \$80 million.

New capital expenditure in the city is accounted for by a planned investment of \$40,661,000 in machinery and equipment and \$29,162,000 in construction. There is a decline in the planned investment in the iron and steel industry, while the wood and paper products industry, which across Canada is planning smaller expenditures in Toronto, shows an increase in its program from \$13 million to \$19 million.

In discussing production of building materials across Canada the report emphasizes that retention of price controls in some basic items and slow decontrol in other fields has made it possible for prices to be adjusted without substantial fluctuations.

Builds Strike Hedge

Springfield, Ohio

• • • More than one-fourth of all the coal used annually for heating the Superior Engine Div. plant of The National Supply Co. here can be stored in four new concrete silos. It is National Supply's answer to a coal strike or any circumstances that would delay coal shipments except for an extended period. The silos will store 1000 tons of coal.

Allis-Chalmers' Strike Causes Earnings to Fall

Milwaukee

••• In the annual statement to stockholders, Walter Geist, president, Allis-Chalmers Mfg. Co., pointed out that "the economic upheaval in 1946, which was disguised as a labor dispute but was the machinations of a communist dominated union, was responsible for the decreased earnings of the company."

The net profit for the year ending Dec. 31, 1946, was \$144,487 after all charges and a credit of \$25,400,000 representing the estimated recovery of prior years' federal income taxes. This compared with a 1945 net profit of \$7,090,467. The decreased production was reflected in the total sales billed for 1946 of \$93,840,030, as compared with 1945 billings of \$290,375,325. Unfilled orders on Dec. 31 amounted to nearly two and a half times the unfilled orders for the same date in 1945.

Monarch Reports Earnings

Sidney, Ohio

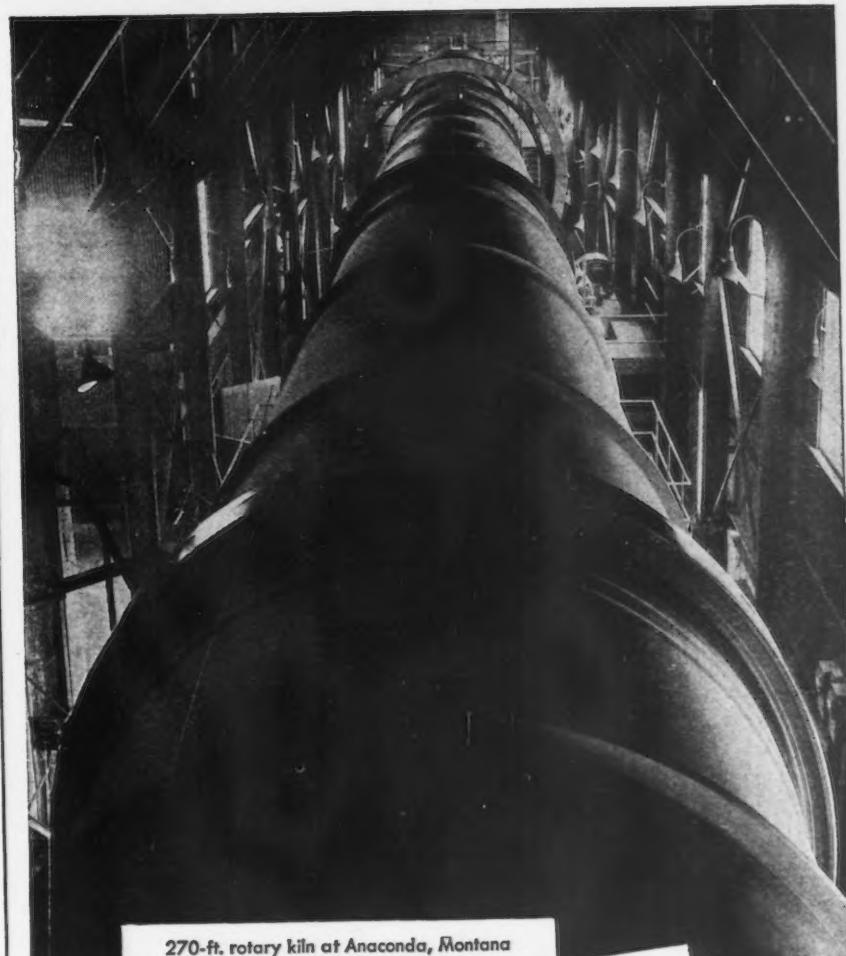
••• Net earnings of \$678,476 for 1946 on gross sales of \$7,368,712 have been reported by Monarch Machine Tool Co. Net is equal to \$3.32 per share on the 210,000 shares outstanding, compared with \$2.66 per share for the previous year. Gross sales for 1945 were \$14,775,426.

In his letter to shareholders, Wendell E. Whipp, Monarch president, said the company's foreign sales were a particularly bright spot in the year.

Midland Steel Net Down

Cleveland

••• Midland Steel Products Co. has reported 1946 net income of \$1,552,889 after all charges including federal income tax. Net is equal to \$2.90 per share of common stock and compares with 1945 net income of \$1,719,775, or \$3.61 a common share. An estimated credit of \$528,000 under the carry back provisions of the income tax law was included in 1946 net income. Current assets at the end of 1946 totaled \$15,513,975.



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Western Metal Congress

(CONTINUED FROM PAGE 77)

types of mills is feasible, and commercial application of these developments will result in appreciably lowered costs, John C. McDonald, assistant technical director, magnesium division, Dow Chemical Co., stated.

Possibility of rolling magnesium sheet on large continuous mills of the type now used for steel and aluminum has been demonstrated, and such equipment will make possible maximum economies.

Turning to castings, he discussed chlorination of melts both as good cleansing procedure and as a method of eliminating hydrogen. It has been shown that some decrease in the tendency toward microporosity can be obtained by keeping hydrogen in a melt to a minimum. Tests described indicated that 20 min of chlorination gave a panel of maximum soundness (Fig. 1). Hydrogen analyses of the product showed that about this amount of chlorination or a little more reduced the hydrogen in the melt to the level of its solid solubility in magnesium. There was then no excess hydrogen to be liberated during the freezing process which would prevent the formation of a completely sound casting.

Attention was called to development of a new type of slot gate. The molten metal is poured into a tubular sprue filled with steel wool from which the metal feeds into the casting through a slot. This method makes easier achievement of complete soundness and increases casting efficiency through a lowering in the amount of risering.

Although superheating of magnesium alloys in order to achieve minimum grain size in castings still is standard practice in most foundries, considerable experimental work has been devoted to securing this result through treatment with various carbon containing compounds. As yet, the working out of the process for production scale operations has not been completed, Mr. McDonald said.

Attention was given to the development of zirconium and cerium alloys. A zirconium-zinc alloy has been developed which has relatively high strength properties while retaining the toughness characteristics of the older lower strength alloys. Cerium alloys have been demonstrated to possess properties at elevated temperature which would appear to make them suitable for use as engine parts.

Presence of at least 0.5 pct Zr is extremely effective in raising the solidus temperature of the magnesium-zinc alloys, making possible much higher extrusion speeds, and in producing a cast structure in the billet which promotes an extremely fine grain size in the finished article.

The cast cerium alloys are characterized by a relatively fine grain. Manganese exerts a grain coarsening effect, tending to produce cracking in larger castings. Thus larger castings are made with the binary cerium alloys, generally with about 6 pct Ce content.

The tensile strength of these alloys are little affected by variations in cerium content, but the hardness, yield strength, and elongation are greatly influenced. A 6 pct Ce content represents a compromise between maximum strength and hardness and minimum elongation. Although the room temperature properties are not high compared to other Mg and Al base cast alloys, a good retention of the properties at elevated temperature is obtained. They are particularly outstanding, compared

to present commercial magnesium base alloys, in resistance to creep.

Aging of High Chromium Iron

In the paper, "High Chromium Irons," presented by H. D. Newell, chief metallurgist, Babcock & Wilcox Tube Co., chemical composition and physical and mechanical properties of ferritic high chromium irons were discussed.

Data were presented on the aging properties of these materials including sigma phase precipitation in the Type 446 material with the effects of age hardening in the so-called 475 C. embrittlement range. Under like conditions of exposure, relatively pure high chromium alloys containing up to 30 pct Cr show good stability against sigma phase precipitation as compared with the usual commercial alloys. However, these pure alloys show the same degree of hardening on aging at 475 C., indicating the latter phenomenon is primarily a function of the chromium content.

A case of aging embrittlement in service of type 405 alloy, heretofore thought immune to 890°F embrittlement, was described. This was contrary to results secured on an aging test recently initiated.

Special equipment and practices used in high frequency induction heating in mass production of tractor and equipment parts were described by G. C. Riegel, chief metallurgist, Caterpillar Tractor Co. The work discussed involved the use of 3000, 9600, and 450,000 cycles.

A single piece of equipment for induction hardening, shrinking to assemble, and tempering tractor flanged track roller rims was developed to selectively heat the tread of the roller, the inner face of the flange, and the fillet adjoining the tread and the flange (fig. 2). The problem involved hardening the surface to plus RC 52 without quench cracking the tread or flange; hardening to a minimum depth of 0.140 in. and at this depth to an RC 50 minimum; while heating expanding the part uniformly to provide a close shrink fit to a mating hub; fulfilling a press-off value of 75,000 lb; leaving sufficient residual heat in the assembled component to temper the hardened area.

Continuous through hardening of mill length bar stock, used in manufacture of studs and tie rods machined on automatic lathes, is employed to secure qualities not possible by conventional treatment. The finished material must necessarily be clean, straight, of good machinability, and uniform in hardness, de-carburization held to a minimum and not augmented by heat treatment. All heat treatment must be completed while the material is in bar form to maintain accuracy of the thread form and to prevent handling damage. Uniform quench and temper is important.

The specific treatment evolved includes pickling and lime coating hot rolled carbon bars which are comparatively straight; cold drawing; continuous hardening and tempering, producing a slight surface blueing; straightening when required. This cycle, it was found, produced improved mechanical properties as compared to previous practice of interrupted batch heating and quenching single bars, tempering, pickling straightening and lime coating, cold drawing, reheating to 450°F. to restore yield strength, and final straightening.

Isothermal cycle annealing of over 2 million pounds of alloy forgings monthly, and accompanying metallurgical controls, were described as providing an optimum exterior, microstructure and hardness, with reduced subsequent machining costs.

NEWS OF INDUSTRY

Weekly Gallup Polls

(CONTINUED FROM PAGE 125)

(3) to strengthen America's position and keep peace.

"Can you tell me what are the chief reasons AGAINST helping Greece and Turkey?"

Principal reasons given: (1) It might lead to war; (2) it would cost too much, we can't afford it; (3) we might forfeit all possibility of Russia's friendship.

Would you favor sending American civilian experts over to Greece to help supervise the uses to which this money will be put?"

Pct.

Yes	83
No	14
No opinion	3

The same question was asked concerning Turkey, with virtually the same result—77 pct in favor, 17 pct opposed and 6 pct no opinion.

"Would you favor sending American military advisers to train the Greek Army?"

Pct.

Yes	37
No	54
No opinion	9

"Would you favor sending them to train the Turkish Army?"

Pct.

Yes	33
No	55
No opinion	12

"Why do you think this problem was not turned over to the United Nations to handle?"

Principal reasons given by voters: (1) The UN is too slow, speed is needed here; (2) the UN is not equipped to handle the problem, not ready to meet such issues, has no money to spend and no police force; (3) Russia would use her veto to prevent any action on Greece.

However, 56 pct indicated disapproval of by passing the UN completely, while 25 pct approved and 19 pct gave no opinion.

"Do you think that lending money to aid Greece and Turkey is or is not likely to get us into war?"

Pct.

Is likely	30
Is not likely	54
No opinion	16

"Do you think the present Greek government has the backing of the majority—that is, more than half—of the Greek people?"

Pct.

Yes	33
No	25
No opinion	42

"Do you think the present Turkish government has the backing of the majority—that is, more than half—of the Turkish people?"

Pct.

Yes	34
No	14
No opinion	52

"Suppose other nations find themselves in the same fix as Greece. Do you think the United States will have to do something about it?"

Pct.

Yes	68
No	20
No opinion	12

"Generally speaking, should the United

Why You Find
SPENCER TURBO COMPRESSORS
in Foundries Everywhere

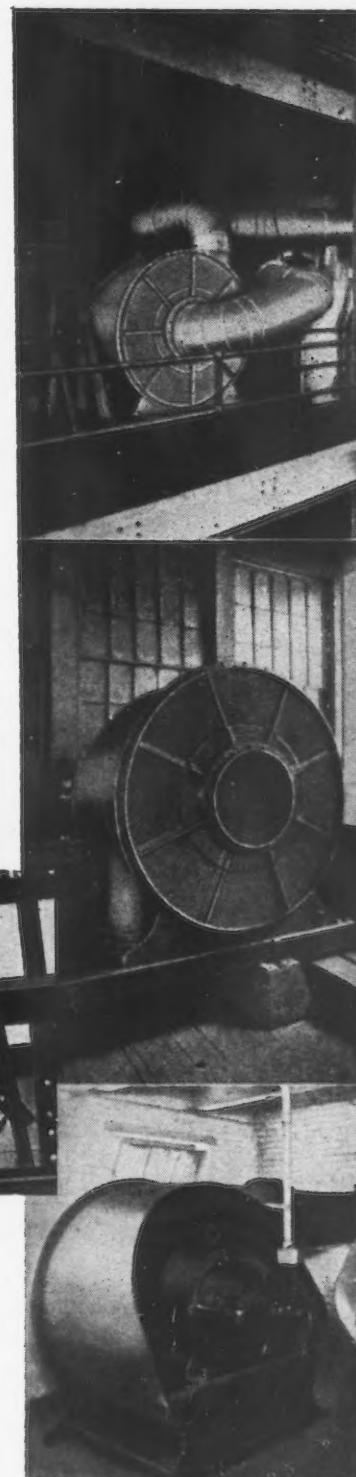
The principal reason why you find so many Spencer Turbos on cupolas is the reliability experienced over years of service.

Simplicity is the answer. One rotating element with wide clearances and only two bearings. Cast iron bridge construction and light weight balanced impellers mean minimum vibration, no special foundations and negligible wear even after years of service.

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States take a strong stand in European affairs, or should we try to get out of European affairs?"

	Pct.
Take strong stand	58
Get out	32
No opinion	10

• • • Veterans of World War II, who risked their lives to insure peace throughout the world, vote in favor of President Truman's aid-to-Greece policy by a majority as large as the rest of the country.

The veterans included in the sampling voted as follows:

"Do you approve or disapprove of the bill asking for \$250 million to aid Greece?"

VETERANS OF WORLD WAR II

	Pct.
Yes	57
No	36
No opinion	7

The vote for the whole public was as follows:

ALL U. S.	Pct.
Yes	56
No	32
No opinion	12

Majority opinion among the veterans questioned in the sample is best reflected in what one ex-GI, who saw service in both France and Germany, told an interviewer for the institute.

"I don't care so much about the Greeks, but I calculate that if we let the Commies take over Greece we'd have to kiss goodbye to Europe pretty soon and get out. I think we'd be suckers to get out till we've patched Europe up enough to make sure there'll be no more wars."

The minority opinion among the veterans, consisting of the 36 pct who oppose our proposed action in Greece, is that once we start aiding Greece there will be no end to it.

"Britain tried to bail Greece out," said one vet, "and she couldn't do it. Can we do any better?"

A FORTUNE IN PATTERNS



This is one of our storage sections. **Strenes Metal** castings have been made from these patterns.

Here are patterns for forming and drawing dies used by many of the largest sheet metal fabricators . . . manufacturers of appliances, automobiles, bicycles, blowers, caskets, implements, tractors, trucks, vaults, etc.

Here are also patterns for **Strenes Metal**

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DRAWING AND FORMING DIES

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NEWS OF INDUSTRY

The London Economist

(CONTINUED FROM PAGE 129)

weak king, might decide that they also do not like policing the headquarters of the Suez Canal.

No alternative to the Truman proposal has yet been seriously presented, but the Administration's bill will hardly go through without amendment. The preamble is already under revision. A suggestion has been made, and vigorously refused, that Greek aid might be separated from Turkish. The latter is tied to the stronger Greek case, perhaps in the hope that its predominantly military character might be overlooked.

Meanwhile the costs of the new policy, both in its present stage and its not impossible future development, occupy Congressional attention. Hearings on promised tax cuts are proceeding as calmly as though in soundproof cells, but the sums already spent on Greece make it difficult even for an optimist to believe that half of the famous \$400 million will put Greece back on her feet. Since V-E Day she has, according to figures recently released, had the following sums:

From UNRRA, \$345 million (of which \$254 million came from USA);

From the USA, \$181 million (lend-lease, surplus property, Export-Import credit, maritime aid, etc.);

From Britain \$44 million (a loan which was later made a gift, plus surplus property credit).

This totals \$570 million, and averages \$185 million a year, to which should be added \$30 million flowing annually from the Greek-American colony in the form of emigrant remittances.

Other countries are also indicating other needs. Korea has suggested that she could also use \$400 million. China changes the figures, adds more ciphers, thinks she would like \$1600 million. Americans can hardly be blamed if they begin to wonder what will happen when all is spent.

Such considerations explain the sudden enthusiasm for such United Nations organisms as the World Bank, which might help take the contemplated load off Uncle Sam's shoulders. Few Americans have learned to contemplate with equanimity a world in which 60 other

OUT OUR WAY



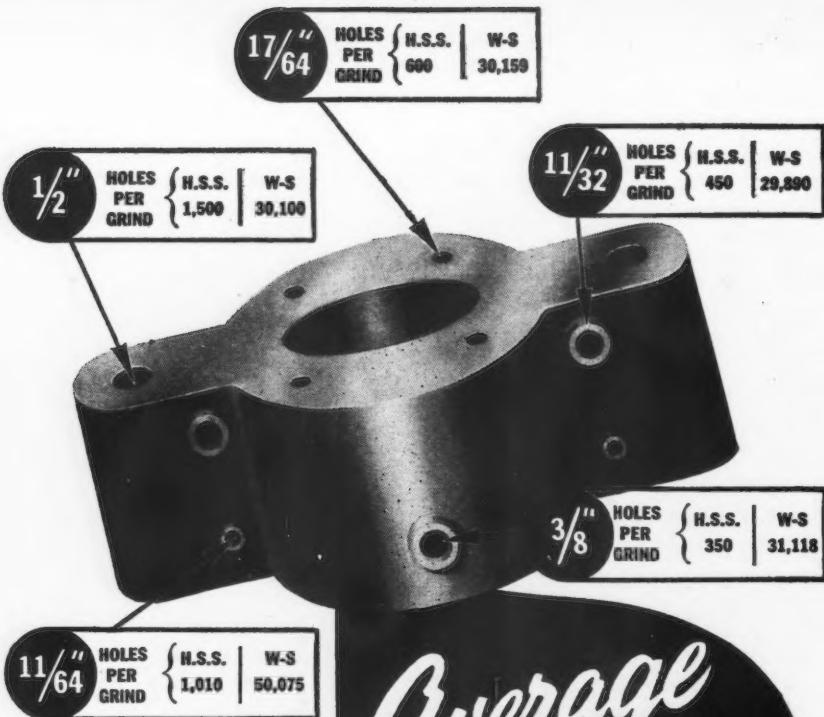
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NEWS OF INDUSTRY



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nations appear to be facing bankruptcy and are eager to borrow.

Nor does it help to be told that, under present conditions, if the World Bank were prepared to grant the needed loans it would be largely for the reason that American bankers had seen fit to direct capital that way. The wriggling that goes on in an attempt to escape the implications of America's present financial strength would break the back of an agile anaconda.

Meanwhile, related uncertainties do not make the road to decision any easier. If the State Dept. knows what Britain means to do about other European problems when she gets her troops out of Greece, that information has not reached the American people. Does this withdrawal herald a long-term shift in British policy, or is it merely the device of a Labor Government which, finding it uncongenial to deal with a particular king, decides to seek greener pastures nearer home? Is Britain dropping distant commitments in order to carve an area of vital interest in Western Europe where maintenance charges will be less and heads of government more the kind of people with whom Labor likes to deal?

The American people are learning that the concomitants of power wear many faces. The process of learning is so difficult that only the possibility of action sustains them. At the moment, Congress is showing itself aware that when Americans prepare to reverse an ancient adage, they must also exercise care in picking the messengers they will send bearing gifts to Greeks.

To Hold Sale in Bermuda

Washington

• • • Bids have been asked by the Foreign Liquidation Commissioner for \$2.5 million worth of new and used surplus property located in Bermuda. Arrangements to inspect the property may be made with the FLC office at the Hamilton Hotel, Hamilton, Bermuda.

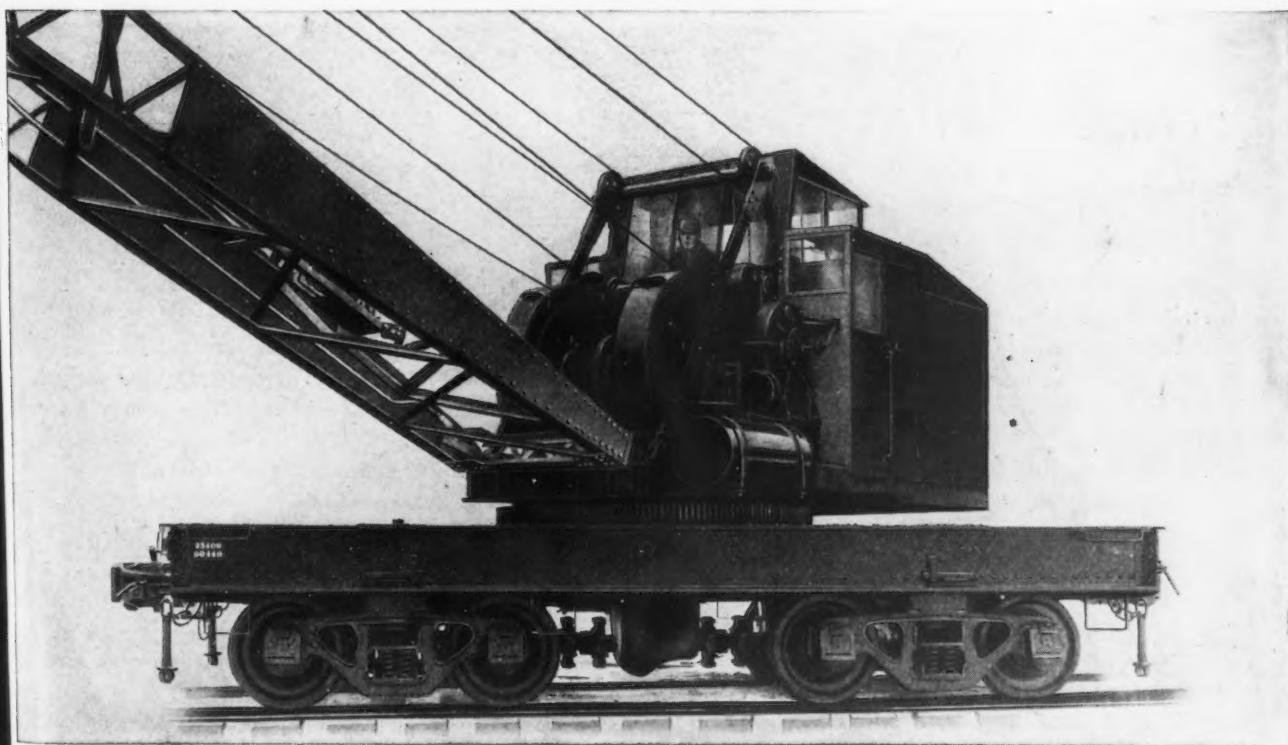
Included in the material for sale are general purpose machinery and parts, road construction machinery, tractors, tools, plumbing supplies, basic materials and products and other general classifications of items.

Smooth, easy swing

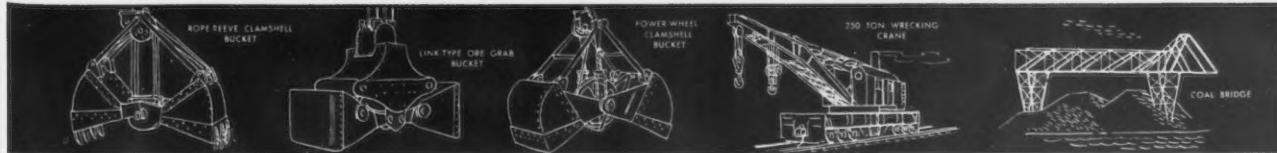
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gineering and construction features including roller bearings at all essential points and one-piece cast steel bed with 14" safety clearance between rotating bed and car body. These are just a few of the many reasons why you can depend on a BROWNHOIST crane for maximum efficiency in handling materials with hook, magnet, or bucket at lowest operating and maintenance costs. Write for full particulars.



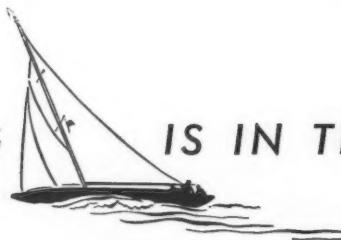
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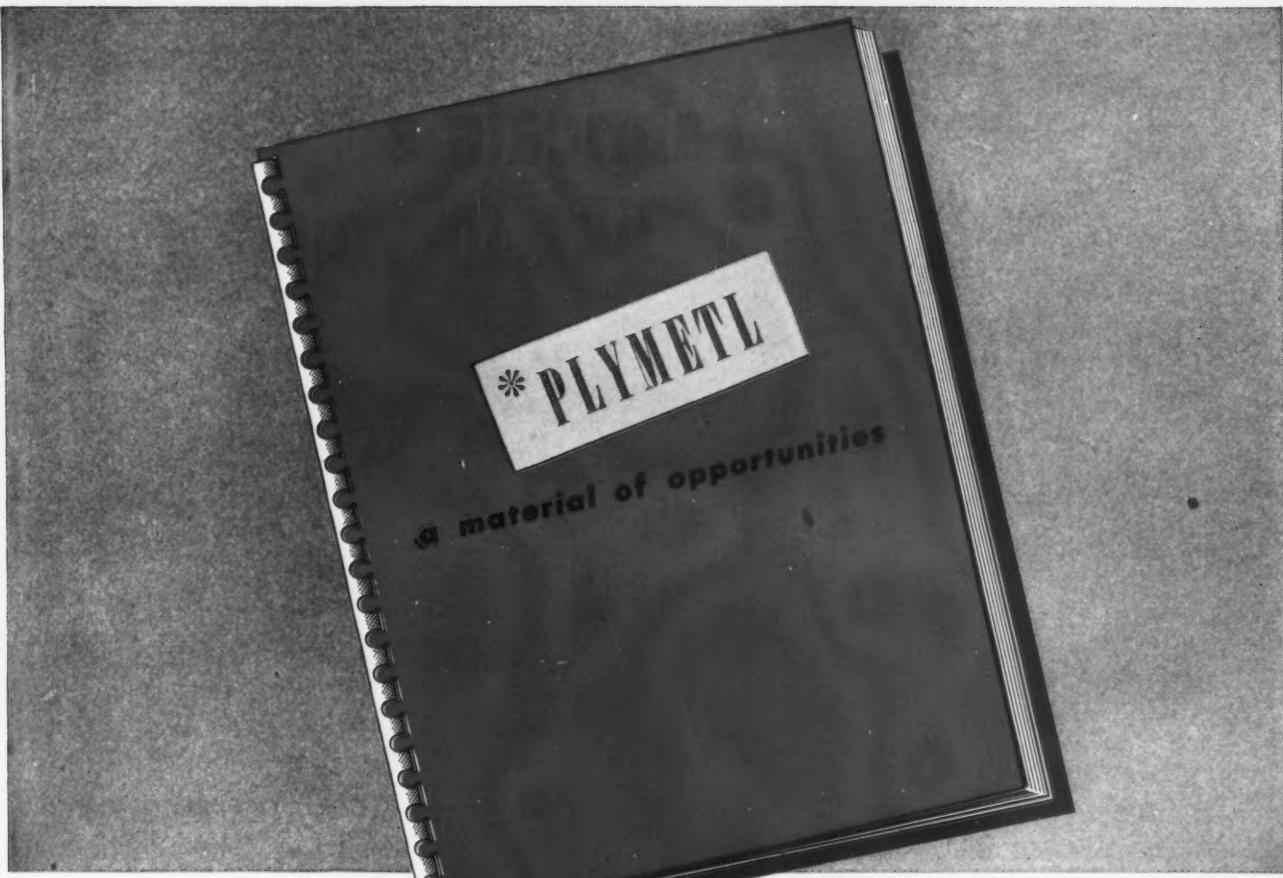
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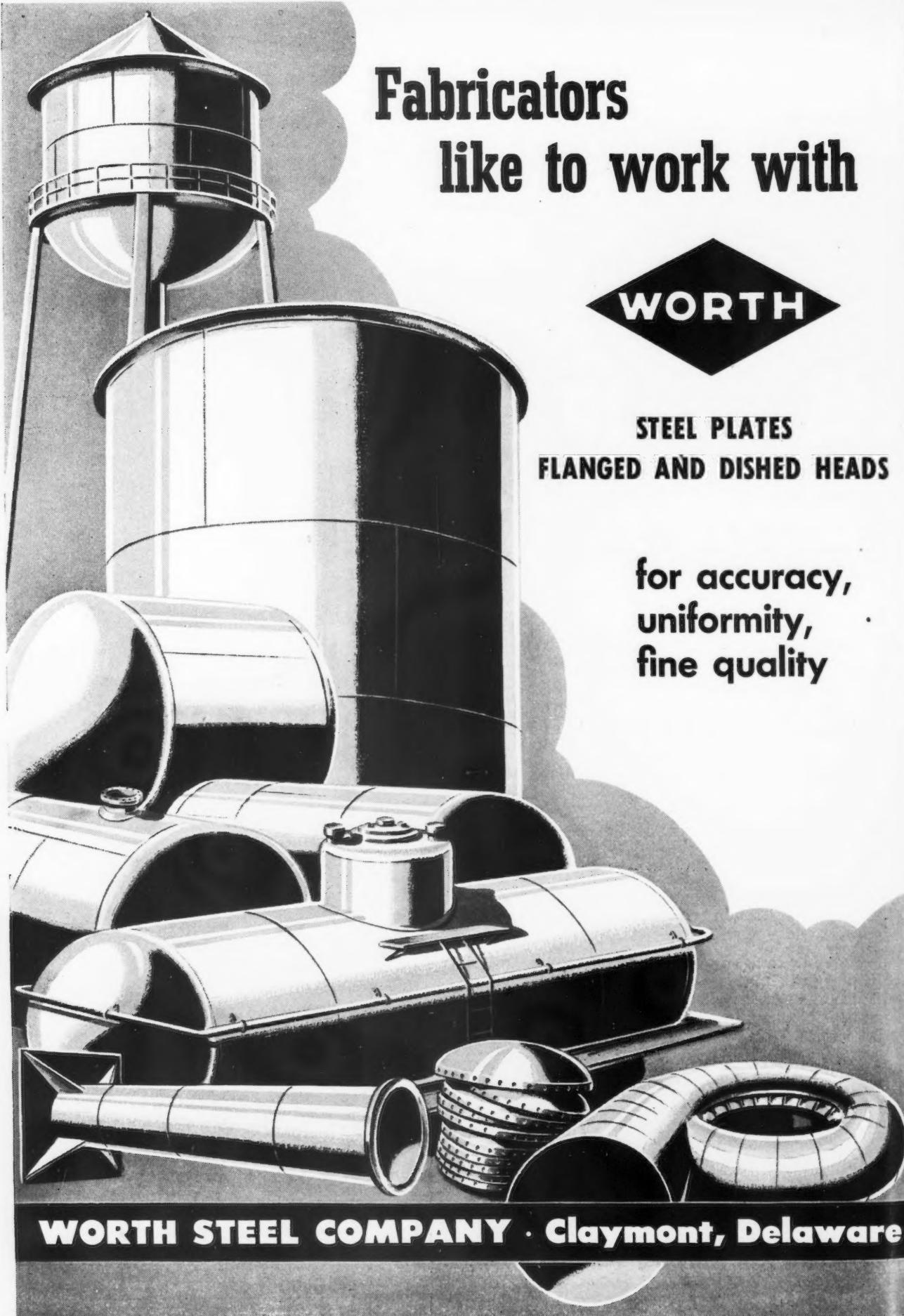
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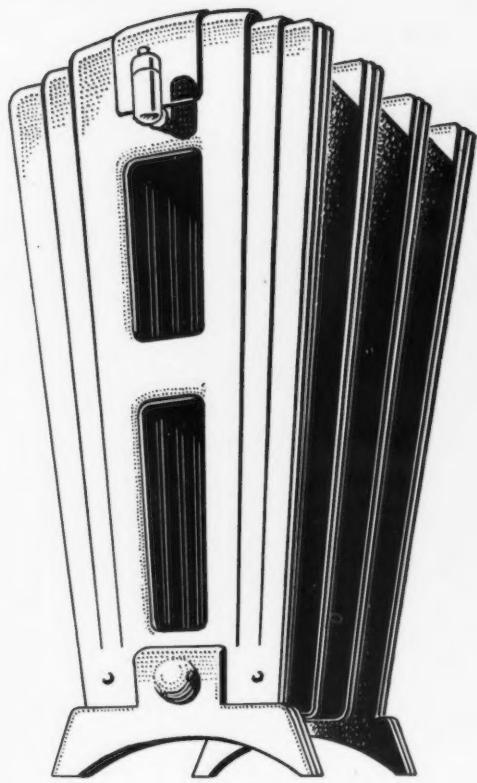


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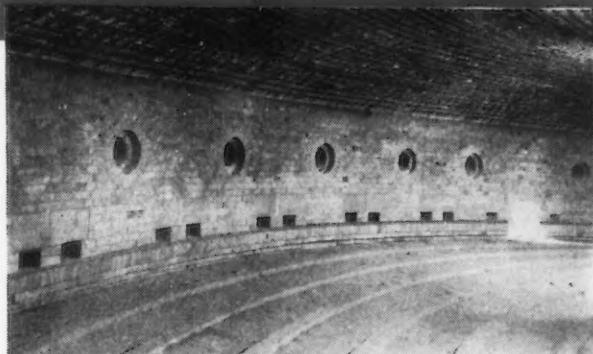
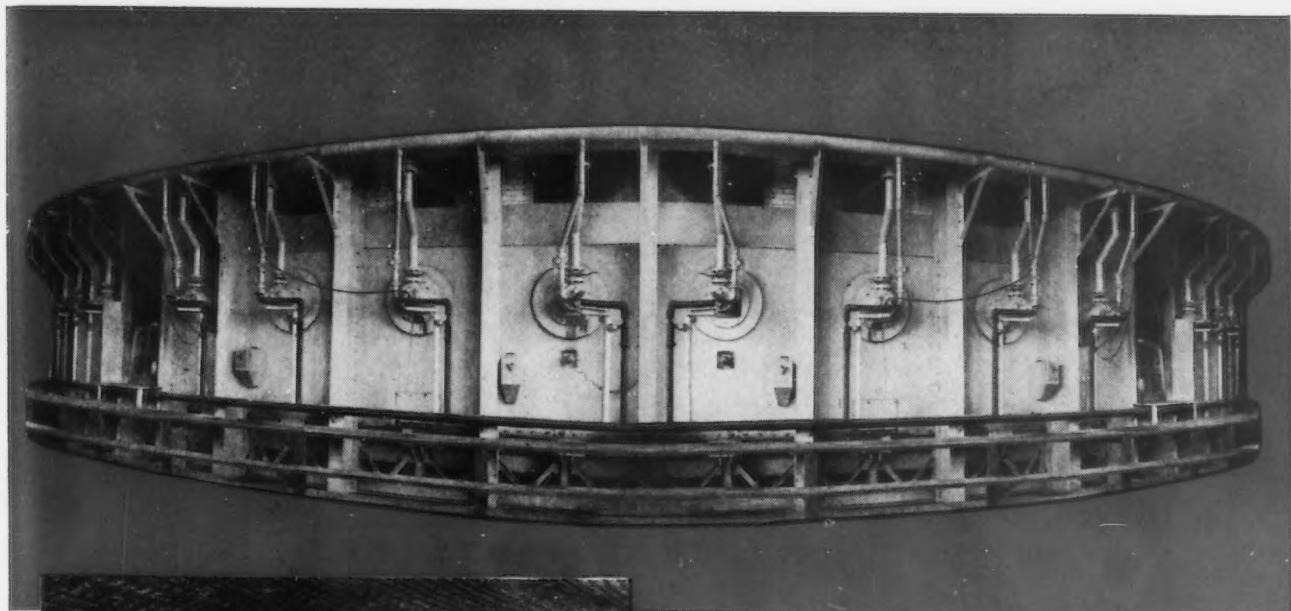
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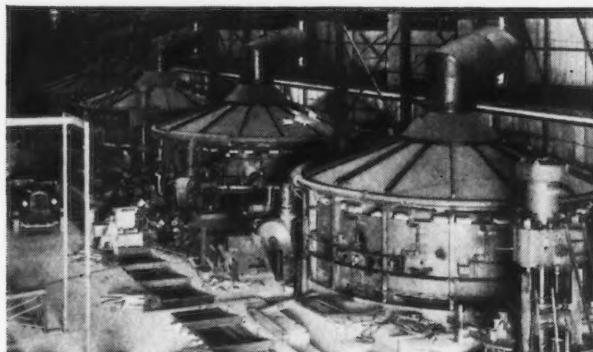


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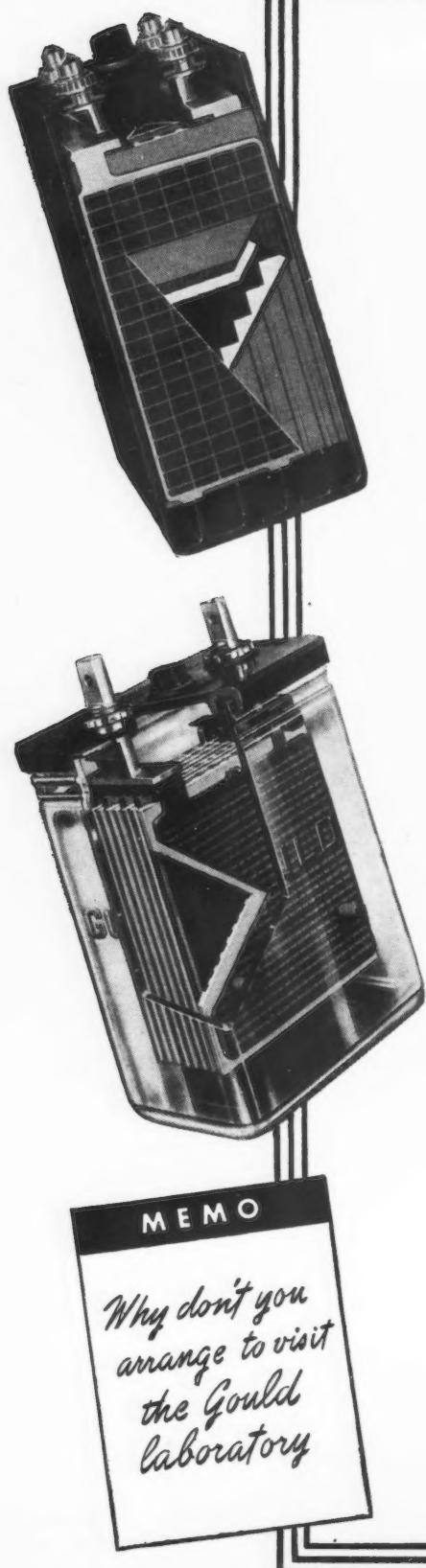
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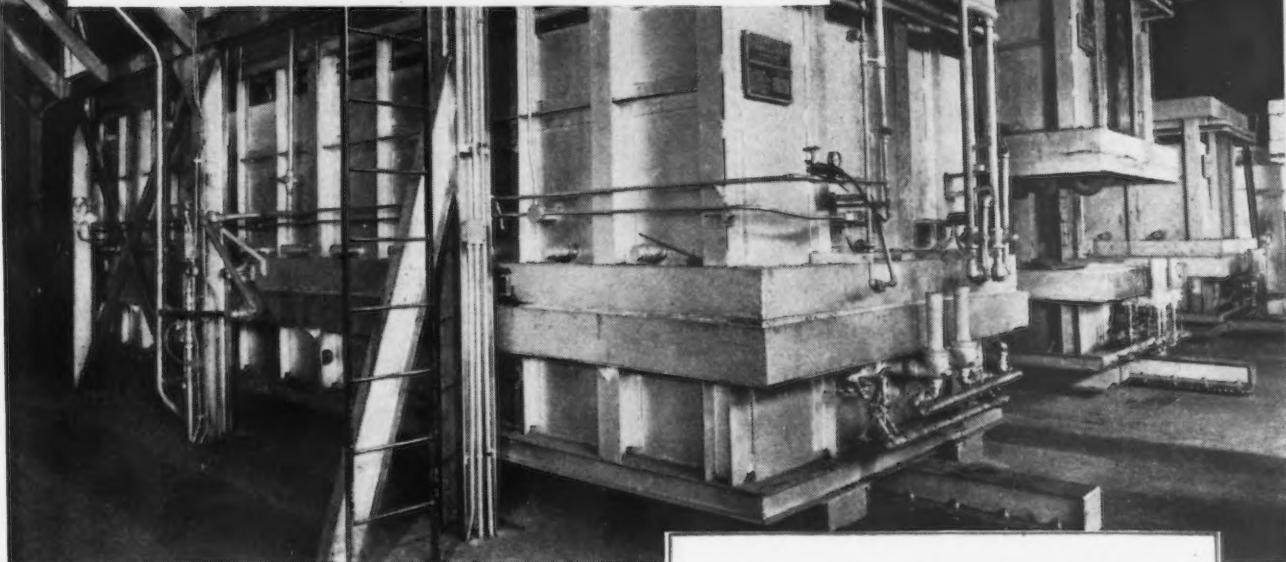
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How cork "burn-out" combines low heat storage and durability



If refractory linings store little heat, furnaces reach operating temperatures more rapidly, production increases, fuel costs drop, and product quality improves due to better temperature control. Low heat storage is one of the big advantages of Armstrong's Insulating Fire Brick. This quality has been attained because cork "burn-out," an exclusive Armstrong feature, makes these brick light in weight without sacrificing strength or other desirable characteristics.

When the clays for Armstrong's Brick are mixed, carefully graded particles of cork are included. Cork doesn't react to reduce the plasticity of the mix. Also cork burns out slowly, permitting accurate temperature control in firing. These characteristics of a cork "burn-out" make possible a brick that not only is light in weight and has low heat storage but also has the proper balance of other desirable properties.

In Armstrong's Insulating Fire Brick, low heat storage, high insulating efficiency, high strength,

Surface Combustion Corp. built this battery of special atmosphere cover-type furnaces for a large Midwestern steel company. They are used for annealing high and low carbon steel bar stock. These furnaces have car bottoms, are heated by radiant tubes, and are lined with Armstrong's Insulating Fire Brick. Dimensions are 31 ft. long by 6 ft. 6 in. wide.

light weight, and high resistance to spalling are carefully balanced to provide longer, more efficient furnace operation as well as lower installation and maintenance costs.

All brick are accurately machine sized to plus or minus 0.003" tolerance.

Each type of Armstrong's Insulating Fire Brick offers the best performance within its own temperature range—1600°, 2000°, 2300°, 2500°, and 2600° F. A copy of the free booklet, "Armstrong's Insulating Fire Brick," will be sent to you on request. Write to Armstrong Cork Company, Insulating Refractories Dept., 4904 Mulberry Street, Lancaster, Penna.



ARMSTRONG'S INSULATING REFRactories

YOUR DOLLAR BUYS LONGER SERVICE IN



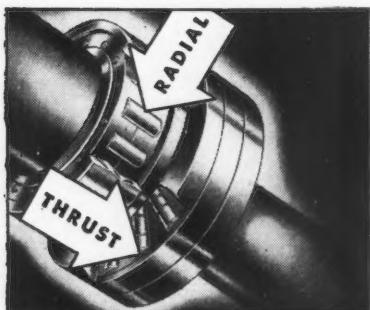
ROLLWAY

RIGHT-ANGLE-LOADED BEARINGS

ROLLWAY's Right-Angle-Loaded Bearings have longer life because Rollway uses the principle of *right angle loading*. This splits every load into its component parts of pure radial and pure thrust. Each component load is carried on a separate bearing assembly at a *right angle to the rollers*.

For this reason, Rollway Bearings can use efficiently solid cylindrical rollers of greater mass and cross section area in a given space. The unit load per roller is lower and the load capacity for a given dimensional limit is higher.

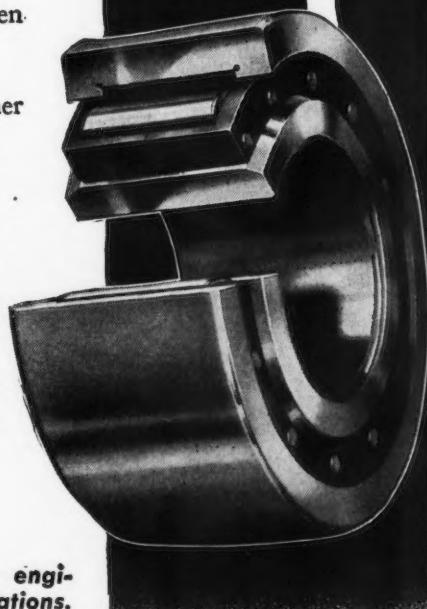
As the diagram shows, no oblique loads or resultants, no other compound loads can pile up to increase the magnitude of the simple radial or thrust component. Resistance to shock and vibration is increased. Pinch-out of rollers is eliminated—with less rubbing friction and less wear-back of roller ends. The net gain is clearly apparent in longer bearing life . . . less service attention . . . and lower maintenance cost.



All radial loads carried at right angles to the roller axis. All thrust loads carried at right angles to the roller axis.

Free Service

Send us your plans today for engineering analysis and recommendations.



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ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Cleveland • Detroit • Chicago • Minneapolis • Houston • Los Angeles



BRITISH INDUSTRIES FAIR

LONDON & BIRMINGHAM, MAY 5-16, 1947

This is your first opportunity in seven years to see your old suppliers in Britain and to meet new ones.

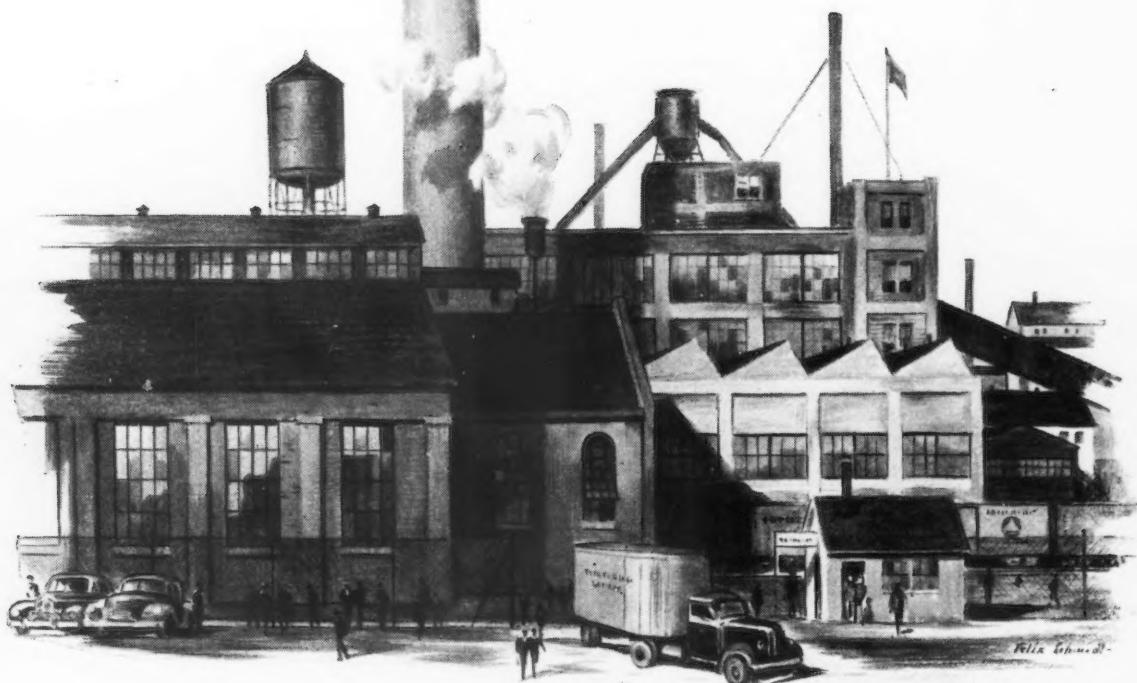
Overseas Buyers are invited to Britain for the 1947 British Industries Fair. It will enable them to establish personal contact with the makers of the immense range of United Kingdom goods displayed in the London (Lighter Industries) and Birmingham (Hardware & Engineering) Sections of the Fair. The careful grouping of exhibits will assist buyers to compare the products of

competing firms with a minimum of time, trouble and expense. Special arrangements to suit individual markets can be discussed and terms and conditions of business settled direct with the manufacturer, since only the actual producer or the sole selling agent may exhibit.

★ *For full details of the 1947 Fair apply to the nearest British Commercial Diplomatic Officer or Consular Officer, or the British Trade Commissioner in your area.*

BRITAIN PRODUCES THE GOODS

WHAT! NO SMOKE?



● You don't see any smoke coming from this factory stack, for the very good reason that there *isn't* any smoke!

But that doesn't mean this factory—and thousands of other smokeless factories today—isn't going at full blast.

What it *does* mean is that an ingenious, inexpensive way has now been developed to cure smoky smokestacks. That way was perfected by the engineers of Bituminous Coal Research, Inc., the national research agency of the Bituminous Coal industry.

Jets of air forced over the fire by a blower—or propelled by steam—supply the necessary

turbulence and oxygen to burn the volatile matter distilled from the coal before smoke can be formed.

Adaptations of this same ingenious equipment are in use on thousands of locomotives. And home owners will soon hear of a new coal stove that also "eats its own smoke."

And all this is just a sign of the many good new things that are coming from coal. For the Bituminous Coal industry's research program is dedicated to devising new methods and new equipment for coal utilization to benefit not only the manufacturer, but also

the railroad man, the farmer, the home owner—in fact, every living person in America!

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BITUMINOUS COAL INSTITUTE

Washington, D. C.

Affiliate of NATIONAL COAL ASSOCIATION

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Inner and Outer Rings and Ball Retainer.**

3000 SERIES DIMENSIONS AND LIST PRICES

BEARING NUMBER			BORE	OUTSIDE DIAMETER		WIDTH	CORNER RADIUS	BALL DIAM.	LIST PRICE	CODE WORD		
NO SHIELDS	SINGLE SHIELD	DOUBLE SHIELD	INCHES +.005 -.000	INCHES	TOLERANCE +.0000 TO MINUS -.005	INCHES +.005 -.005	INCHES	INCHES		NO SHIELDS	SINGLE SHIELD	DOUBLE SHIELD
3001NS	3001SS	3001DS	3-16	11-16	-.0005	1-4	.015	1-8	.45	JENBE	JIBBE	JODBE
3002NS	3002SS	3002DS	1-4	11-16	-.0005	1-4	.015	1-8	.45	JENAB	JIBAB	JODAB
3005NS	3005SS	3005DS	5-16	29-32	-.0005	5-16	.015	1-8	.45	JENCH	JIBCH	JODCH
3006NS	3006SS	3006DS	3-8	29-32	-.0005	5-16	.015	1-8	.45	JENFO	JIBFO	JODFO
3007NS	3007SS	3007DS	7-16	29-32	-.0005	5-16	.015	1-8	.50	JENGU	JIBGU	JODGU
3014NS	3014SS	3014DS	3-8	1 1-8	-.0005	3-8	.025	3-16	.50	JENDJ	JIBDJ	JODDJ
3015NS	3015SS	3015DS	7-16	1 1-8	-.0005	3-8	.025	3-16	.50	JENEN	JIBEN	JODEN
3016NS	3016SS	3016DS	1-2	1 1-8	-.0005	3-8	.025	3-16	.50	JENHA	JIBHA	JODHA
3020NS	3020SS	3020DS	7-16	1 3-8	-.0005	7-16	.025	7-32	.55	JENIC	JIBIC	JODIC
3021NS	3021SS	3021DS	1-2	1 3-8	-.0005	7-16	.025	7-32	.55	JENLD	JIBLD	JODLD
3022NS	3022SS	3022DS	9-16	1 3-8	-.0005	7-16	.025	7-32	.55	JENJF	JIBJF	JODJF
3023NS	3023SS	3023DS	5-8	1 3-8	-.0005	7-16	.025	7-32	.55	JENJK	JIBNK	JODNK
3033NS	3033SS	3033DS	5-8	1 3-4	-.0005	1-2	.025	1-4	.75	JENPS	JIBPS	JODPS
3034NS	3034SS	3034DS	11-16	1 3-4	-.0005	1-2	.025	1-4	.75	JENRZ	JIBRZ	JODRZ
3035NS	3035SS	3035DS	3-4	1 3-4	-.0005	1-2	.025	1-4	.75	JENSV	JIBSV	JODSV
3038NS	3038SS	3038DS	3-4	2	-.0006	9-16	.035	1-4	.90	JENTW	JIBTW	JODTW
3039NS	3039SS	3039DS	13-16	2	-.0006	9-16	.035	1-4	.90	JENUM	JIBUM	JODUM
3040NS	3040SS	3040DS	7-8	2	-.0006	9-16	.035	1-4	.90	JENVT	JIBVT	JODVT
3041NS	3041SS	3041DS	1	2	-.0006	9-16	.035	1-4	.90	JENWG	JIBWG	JODWG

Outside diameter has ground finish to indicated tolerances.

Corner Radius indicates maximum fillet radius in housing or on shaft which bearing radius will clear.

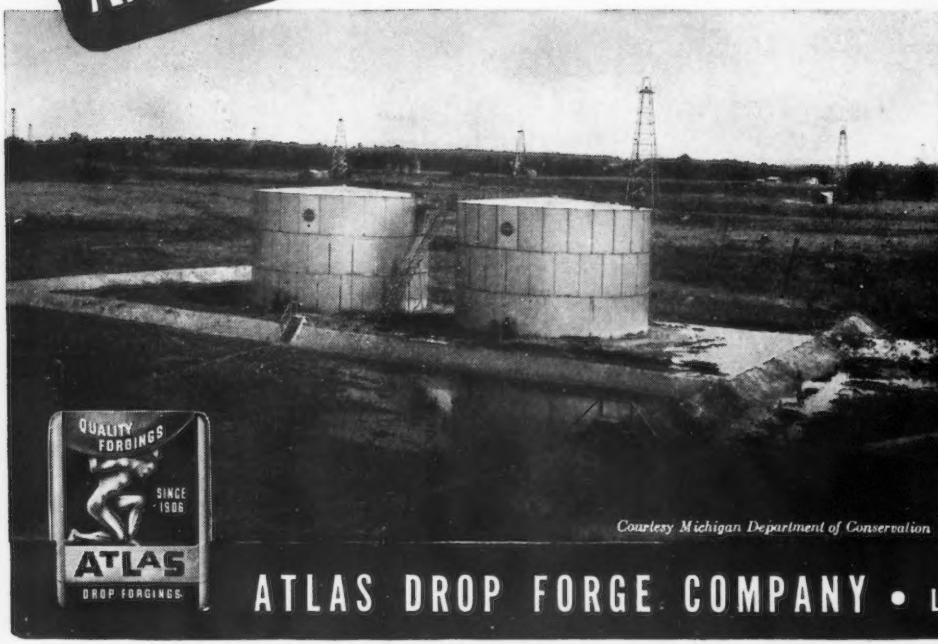
The above list prices apply to 3000 DS, SS and NS types for quantities up to 99 pieces. See discounts on page 6, Catalog No. 125 or 125A. Write for special net prices on larger quantities.



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Courtesy Michigan Department of Conservation

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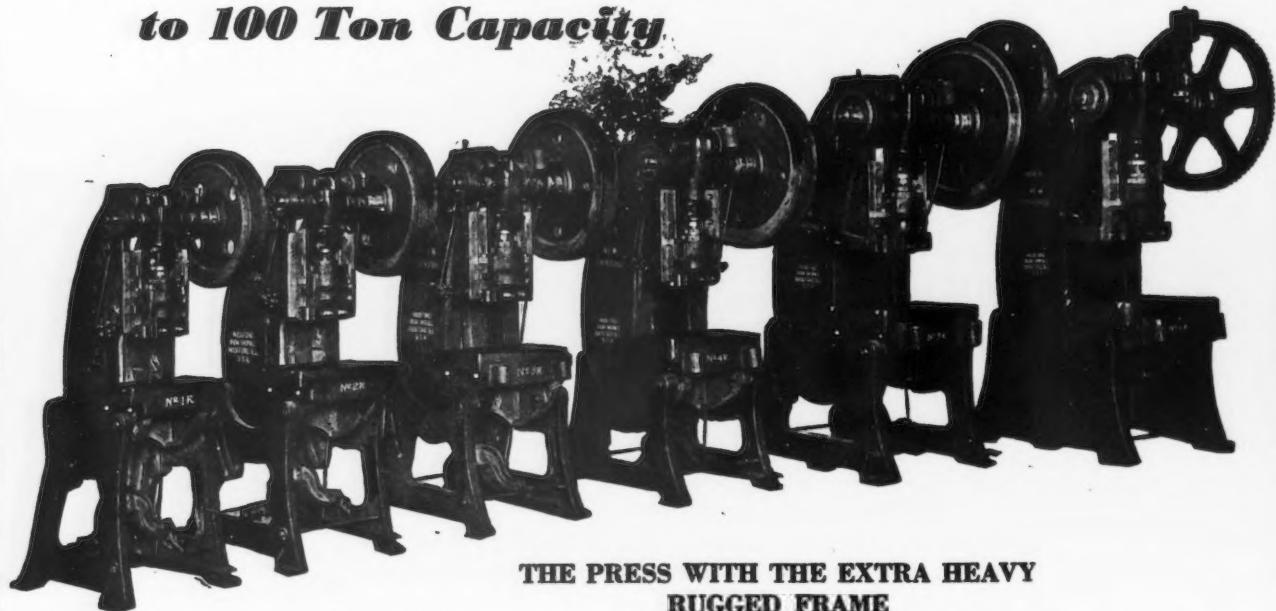


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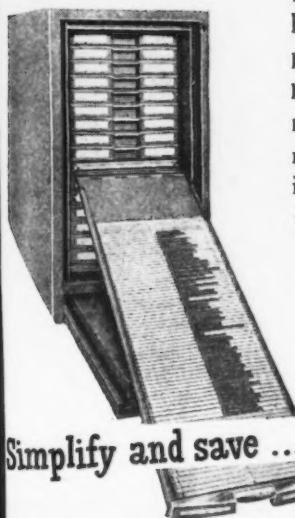
EXAMPLE: One typical company replaced their rule-of-thumb purchasing procedures with an integrated Remington Rand system. Results:

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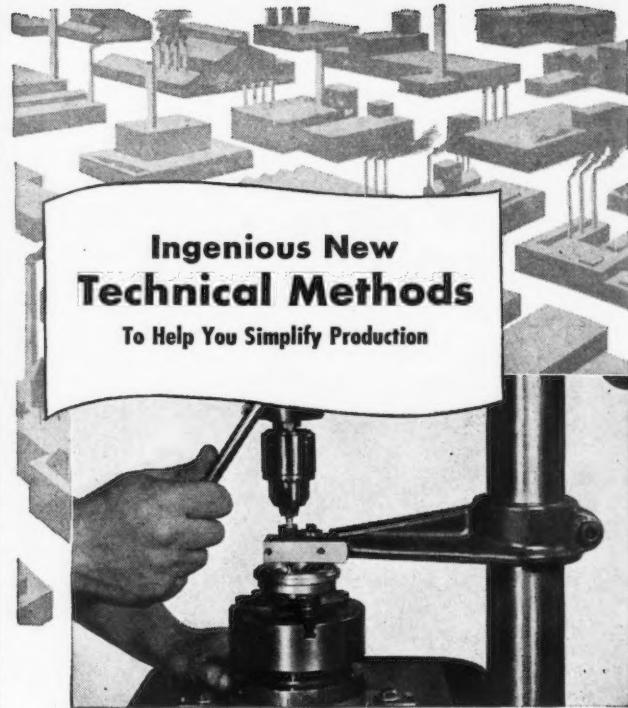
Don't Risk THE WRONG FLUX

- Good soldering jobs depend on the right flux—and Kester has the right flux for you. You can count on Kester for a flux that will properly clean, prevent oxidation, make way for a tight bond that will resist shock, vibration, twisting, bending, and the contraction and expansion of temperature extremes.
- Growing out of nearly half a century of practical experience, Kester's hundreds of flux formulas have been time-tested in laboratory and industry, to establish exact specifications for every flux need. Among them is the ideal flux formula for your particular soldering job.
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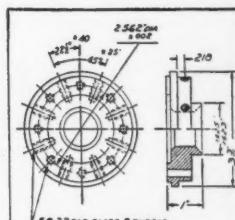
Precision Adapter for Drill Presses Perfects Alignment—Prevents Drift!

The new Aetna Adapter, of aluminum alloy, fits the columns of most small drill presses—assures accurate milling and deep hole drilling—without a drill jig. It firmly and accurately holds interchangeable drill bushings close to work.

Precision alignment is accomplished through an eccentric aligning bushing, which once set needs no further adjustment. Filler bushings cover the entire bushing range up to $\frac{1}{2}$ ". Stops to locate the piece to be drilled, are attached to the press table or directly to the adapter. Milling chatter is avoided. Chip interference is eliminated. Overlapping holes can be drilled without punch marks, or indication of run-out, with drills as small as $\frac{1}{32}$ " diameter. $\frac{1}{4}$ " holes can be drilled more than 6" deep with as little as .006" drift.

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You can get complete information from
Aetna Mfg. Co.,
250 Chicago Ave., Oak Park, Ill.



Example of piece
drilled with Aetna Adapter



SPEED and ECONOMY on Wheels!

GET ALL THE FACTS •

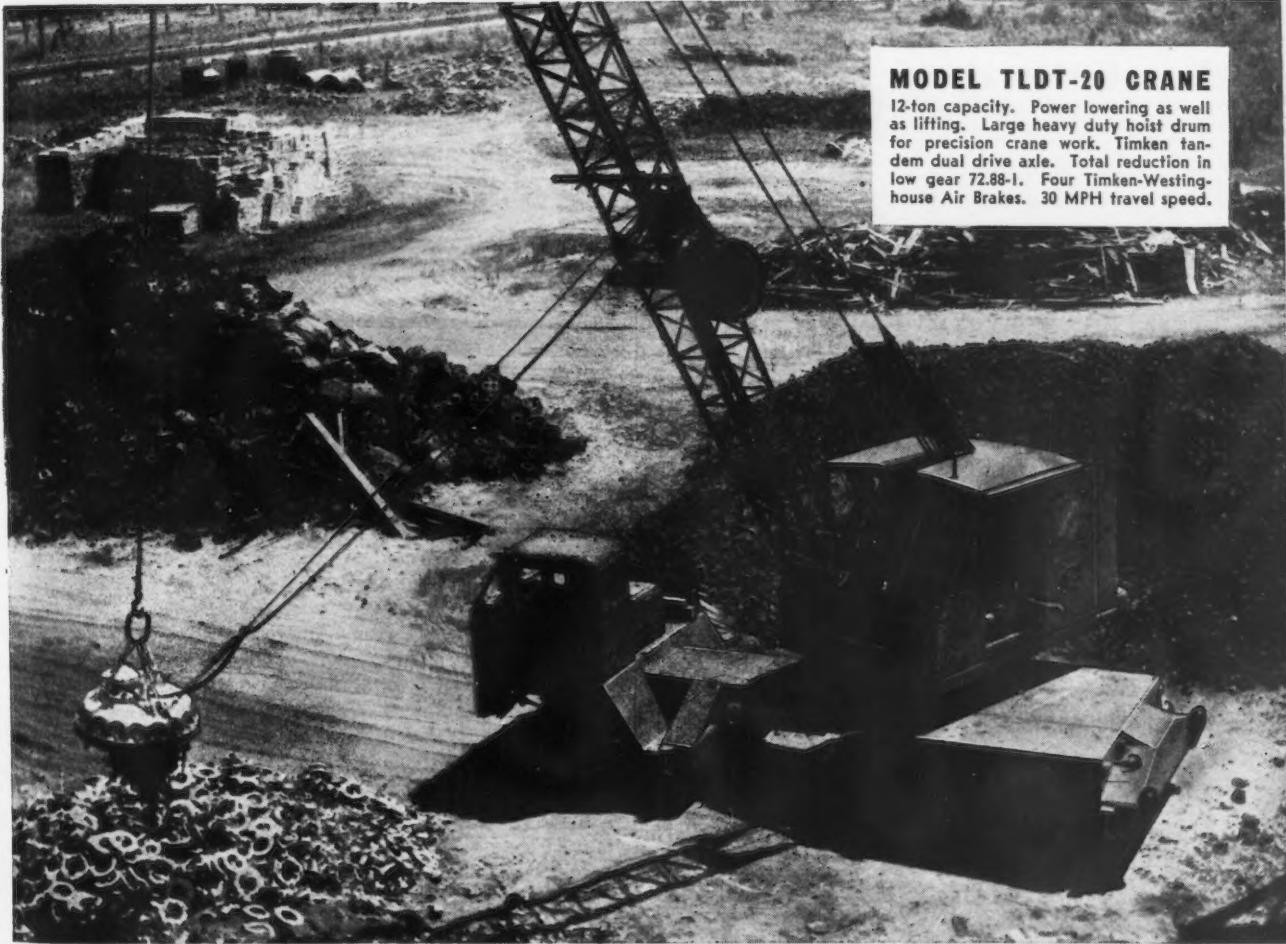
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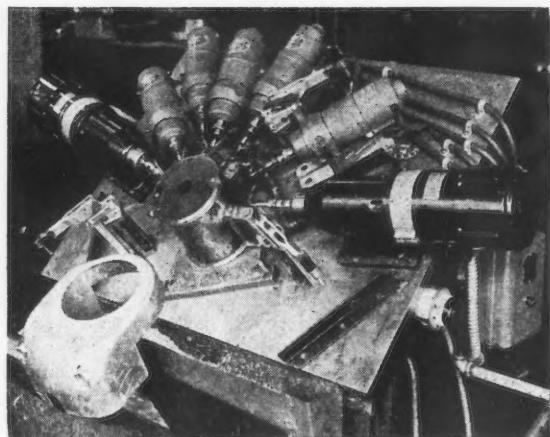
No waiting—no delays! Out on the job or around the yard MICHIGAN Mobile CRANE'S time-saving, cost-cutting operating speed, economy and truck mobility pays off on every lifting and excavating job. Long-time MICHIGAN owners will tell you that for crane, clamshell, dragline, trench hoe and shovel work the fully convertible MICHIGAN Mobile SHOVEL-CRANE is truly "speed and economy on wheels"!



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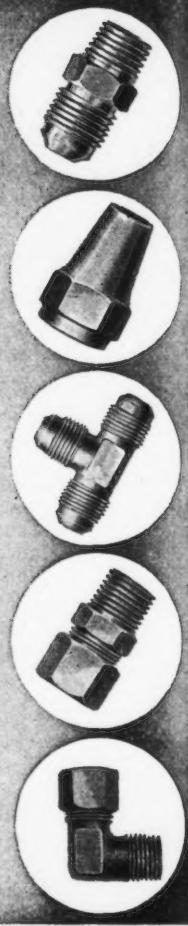
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Brass Pipe and Tube Fittings



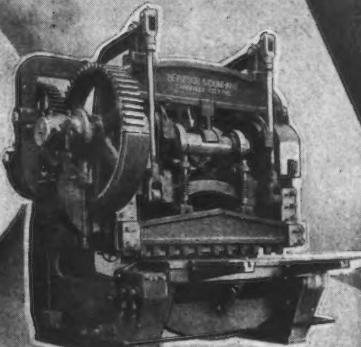
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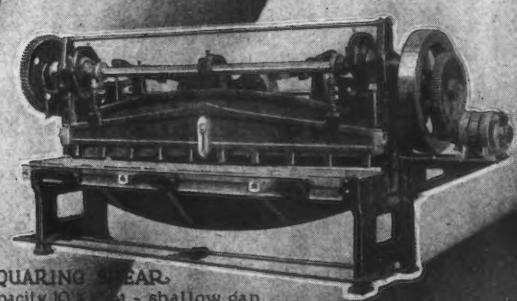
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"WHEN I was asked, 'Gagnon, do you like your job?', I didn't know at first which one to answer for. I can, and have, done just about every job in this mill, where, by the way, the finest writing papers in the country are produced.

"My regular work is pattern making. But I've become a sort of trouble shooter here because I'm handy with all sorts of tools and, I'll wager, at one time or another, I've worked in every department in the mill. Been here for over 30 years and never missed a whistle. That ought to be the answer. I like my work, I like my Company and the men I work with are all my kind.

"I manage to keep busy outside of hours, too. Have a number of hobbies, some profitable, some just to keep me out of mischief. For one thing, I carve and sell wooden horses for carousels—merry-go-rounds to you. They must be good because I get orders from carnivals all over the East. I built my own house, my own way, with my own hands. I'm a hunter of the first water. Two years ago shot a record bear—425 pounder. Do some guiding, too, now and then, and believe it or not, I've tamed two foxes. Spend my spare time entertaining at Veteran and Fraternal Clubs.

"Maybe you think that this is a lot of work for one man. It does keep me busy but it also keeps me happy. I wouldn't be a good State of Mainer if I didn't like to work hard and well.

"So when you ask me if I like my job, my answer is—'You bet'. All of 'em."

William Gagnon

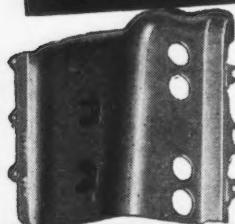
What William Gagnon says, if carefully analyzed, constitutes an invitation for you to establish your industry in Maine. The State of Maine takes great pride in its industrial workers. They are capable, loyal and happy. The success of any industry depends upon the availability of workers with those characteristics.

If you are thinking of moving, expanding or decentralizing, it will pay you to investigate the possibilities of a location in industrial Maine. Send for the free booklet, "Industrial Maine".

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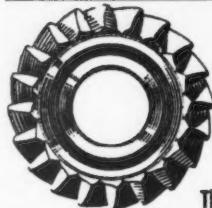
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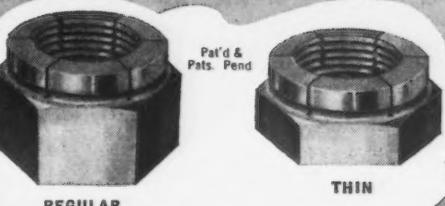
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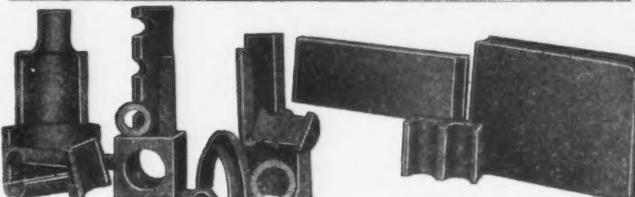
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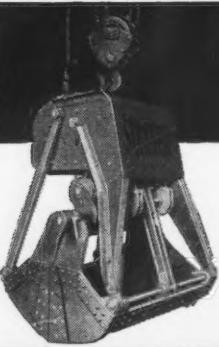
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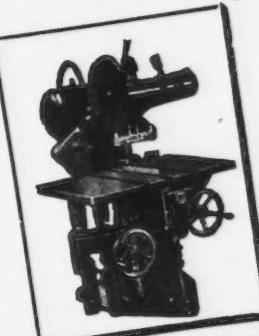
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